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January 17, 1949

# STEEL

The Magazine of Metalworking and Metalproducing

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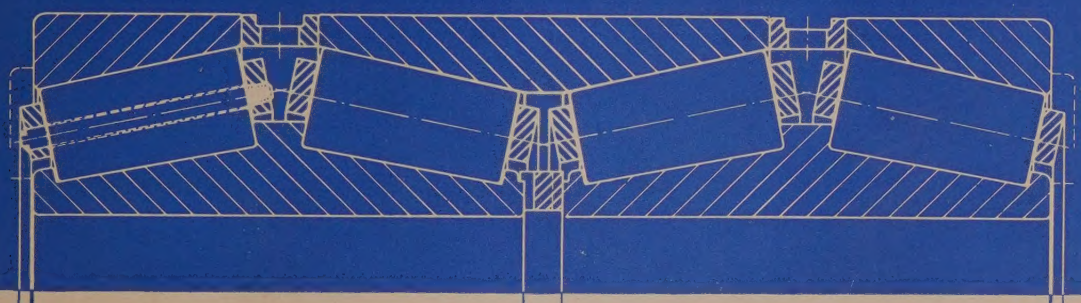

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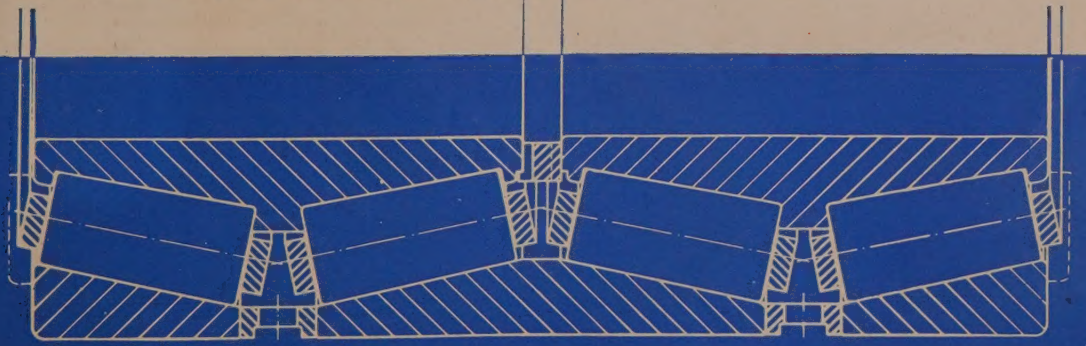

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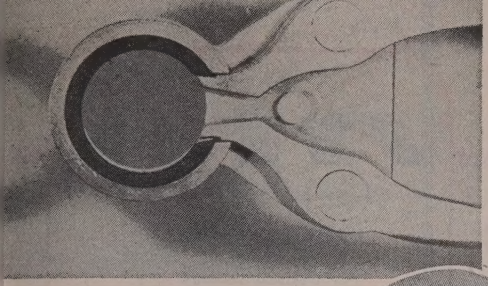


Ring in tool, expanded ready for assembly. By confining the ring within a solid shoulder of the tool, stresses are equally distributed instead of being concentrated at one point, causing distortion.

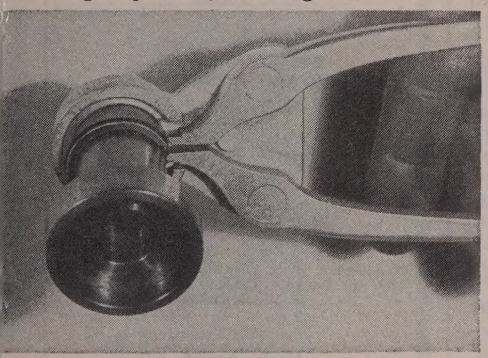
Fitting ring into groove

# STRONG SHOULDERS

## On in a jiffy–

## Off in a jiffy–

Ring in position; removing tool



You don't have to start with oversize material and laboriously machine most of it away to produce strong shoulders on shafts or bearing races. Merely machine a groove at the proper place and slip a strong, tough Reliance Snap Ring into place. In addition to saving valuable time, you profit by large savings in material and machining and finishing costs.

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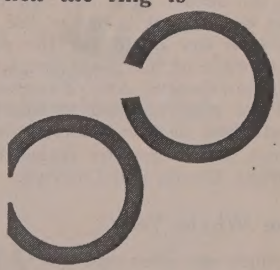

**RELIANCE SPRING LOCK WASHERS**—unbeatable for dependable, enduring bolt tightness. Made from special lock washer steel cold-drawn in Reliance's own mill for maximum reactive pressure. Many types. Write for folder 6-A.

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# Behind the Scenes...

## All About Open Hearths

As we mentioned last week, today's issue carries the opener in the Reinartz article on production of steel in the open hearth. Perhaps it's too trite to call this job an outstanding contribution, which seems to be one of the few phrases of praises reserved for technical literature. Written so a non-technical man can understand it, the material contains a wealth of information of high value to even the technicians of the open hearth. It's another in our current series on "Fundamentals of Steelmaking", and well worth noting here.

## Join Up Now, For Free

The active pen of Cmfwyp, our partner in art, has created the certificate of 205th readership. Copies are even now on their way to the early claimants to that title. If you, too, are the 205th reader of this column, we are now in a position to recognize that fact with suitable formality. Drop us a line, we'll see that an engrossed tiffikit gets in the mail to you.

## Shrdlu Shrdlu Shrdlu

Speaking of Cmfwyp reminds us that we recently received from a worthy contemporary a neat piece of direct mail which has to do with the other two members of the family, Etaoin and Shrdlu. The headline reads, "In 1880 Etaoin Shrdlu came to the publishing world and newspaper circulation zoomed!" It's from the Badger Paper Mills, Inc., of Peshtigo, Wis., and we are all puffed up about it. Of course we realize there was a slight error in the date—instead of 1880 it should have been 1935, which is when we actually did come on the scene. And our own circulation department is one of the last to give us any credit for the zooming circulation of this magazine, let alone any newspapers. And of course, what Badger was referring to was the introduction of the Linotype machine, which is the creature responsible for Shrdlu, Etaoin and Cmfwyp.

## The Whole Year

Since we often call your attention to some special advertising page, perhaps you'll pardon us if we tell you about one of our own. It's on pages 88 and 89 of this issue, and it has been in the works now since last September. We were a little surprised and pleased when we noted that *Life* in its issue of two weeks ago used the same idea—of course we were unhappy that ours had to come later, so it looked like we copied the idea. The first layouts of the ad, which shows all 52 of the 1948 STEEL covers, were made in October. That required a bit of scurrying, because our covers are printed only a relatively short time before you receive the issue, and we had to locate plates from the advertisers, get proofs of them, and make up dummy covers for all November and December issues. The ad was completed in mid-December for January issues of the advertising publications, and also for this issue. We just couldn't squeeze it in the Yearbook issue, and last week also posed some mechanical difficulties. Otherwise, we would have had as early a publication date on ours as *Life* had. Hope you like it!

## Sunshine at Las Vegas

We were stopped dead in our tracks last week when we arrived at page 109 during our regular perusal of STEEL. Not that the ad of the Union Pacific was an outstanding stopper—in its natural habitat it probably would have been accepted at face value. In STEEL, however, it acquired new stature. After all, it isn't every day that you are invited in our advertising pages to take a vacation. In fact, just about all of our big family of advertisers keep exhorting you readers to do a better job, do it more efficiently, at lower cost, etc. Naturally with this sort of background, vacations are sort of quietly whispered about—things you can do without. On page 109, however, the Union Pacific as much as says, "Quit all this hard plugging and come out to Las Vegas, where you can have fun!" Which, we might add, sounds like a swell idea. Wonder how soon we can leave?

## Fifty Years Ago

In Volume 32, No. 3, January 19, 1899, our editor is fearlessly taking his career in his hands and asking for government control of the steel trust, which at that writing was only two weeks old, and which had just succeeded in forming a complete monopoly over all tin plate and wire products. The Pressed Steel Car Co. was formed that week, and the Pennsylvania Railroad advertised a train from Cleveland to Pittsburgh which left Cleveland at 8 a.m. and arrived in Pittsburgh at 8:30 p.m.

Shrdlu

**(Editorial Index—page 27)**

STEEL

Vol. 124—No. 3 January 17, 1949

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**NEXT WEEK . . .**

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**High-Temperature Ceramic Coatings for Molybdenum**

**Manual Handling Reduced 661,000 Pounds Per Day**

**Production of Open-Hearth Steel—Part II**


# STEEL

***The Magazine of Metalworking and Metalproducing***

VOL. 124, NO. 4 JANUARY 17, 1949


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*Editorial Index available semiannually; STEEL also is indexed regularly by Engineering Index Inc., 29 West 39th St., New York 18*

★ Denotes Regular Features.

*Quotation Reproduced From A Letter in Our Files*

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OUR CUSTOMERS' MAN

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*"We feel we have been given a fair share of materials . . ." "Your steel is preferred by the men in our shop" . . . "Your service far above the average warehouse in this area" . . . "Your timely assistance kept our plants operating" . . . "You have been doing everything possible under present conditions" . . . "In a pinch we can depend on Reliance coming through" . . . "You have gone all-out" . . . "You helped us out of a bad situation." . . . etc. . . . etc.*

Reliance is constantly planning and working toward greater production and supply . . . towards higher standards of steel service.

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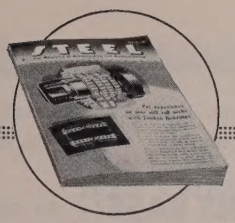



January 17, 1949

# "Welfare State"

Last week the American public witnessed a significant contrast in the attitudes of newly elected chief executives of governments. Incoming governors of states outlined progressive programs, but in most cases emphasized the need for economy in government.

For example, Gov. Frank J. Lausche of Ohio, in his inaugural address, stated that in striving for progress toward the better social order, "we must keep in mind that the desired improvements cannot be achieved overnight and that there are limitations imposed by available funds and by the amounts the people are able to pay in taxes."

Recognition that there are limits to the portion of the people's money that governing bodies can spend has been an orthodox attitude on the part of incoming chief executives of state and federal governments since the birth of the republic. Every President elected prior to 1948 has gone into office with a pledge to be prudent about fiscal matters. Even President Franklin D. Roosevelt, who later turned out to be the greatest spender of all, on his inaugural day in 1933 still was promising earnestly to effect economies in government.

In view of these precedents, the attitude displayed by President Truman in his "state of the union," economic and budget addresses is revolutionary. Unless he registers a note of caution in his remarks at the inauguration on Jan. 20, he will be recorded in history as the first President who upon election has placed little or no emphasis upon economy and who, in peacetime, actually has told the people to prepare for a progressively higher tax burden.

Undoubtedly Mr. Truman justifies his utter lack of concern about money matters by his conviction that his election was a mandate by the people to establish a "welfare state," which all history shows is a condition of federal paternalism that inevitably can lead only to destruction.

Actually Mr. Truman has misconstrued the public's mandate. He has inferred that the people's wish for a fair deal for all individuals entitles him to fashion a national policy out of planks largely furnished by clever but immature brain-trusters in the camps of labor and of reformers.

When the people thoroughly understand the implications of his proposals, they will repudiate much of his program.

* * *

**HOW TO REDUCE COSTS:** Visitors to the third National Materials Handling Exposition in Philadelphia last week were impressed by the number and variety of types of equipment now available to facilitate the moving, storing and packaging of materials and parts. It is certain that many of the manufacturers who inspected the exhibits carefully went back to their plants with new ideas as to how economies can be effected in their manufacturing operations through the use of methods or equipment witnessed at the show.

One could not view the more than 200 exhibits without realizing the tremendous importance of materials handling to the nation's economy. At the present time, when wages are higher than ever before, the introduction of handling equipment to increase the amount of work each employee can perform results in reductions in manufacturing costs that seldom can be matched by any other method.

That is why last week's show was such an outstanding success, and why the materials handling industry expects that the dollar value of

(OVER)

sales in 1949 will increase 10 per cent over that of 1948. It also explains why the volume of business has quintupled since 1941.

Equipment manufacturers also expect an increase in exports. They anticipate that as much as 15 per cent of the total output in 1949 may go to foreign customers, depending upon the availability of dollar exchange, as compared with 12 per cent in 1948. —p. 40

* * *

**ECONOMY VERSUS STYLE:** Speaking at the annual meeting of the Society of Automotive Engineers at Detroit, Lt. Gen. Leroy Lutes of the Munitions Board stated that members of the board are convinced that through standardization the 12,000 separate specifications which existed in World War II can be reduced to less than 8000.

At the same meeting, L. C. Goad, vice president of General Motors Corp., said that the criticism that "automobile design has gotten into a bottleneck of sameness" will be invalidated by the "artistry and individuality of design" which will be developed under the pressure of competition.

Oddly enough, this striving for economy through standardization on one hand and the desire for distinctiveness to capture markets on the other, is reflected in a news item from England. British automobile builders have agreed to use common accessories and components and builders of busses will standardize dimensions of chassis. However, it is declared that "basic designs are not affected and differences of style still will be possible." —pp. 39, 45

* * *

**CONTROL OF THE RUHR:** Interest in the troublesome problem of what to do with the important Ruhr Valley of Germany has been revived by a recent six-nation agreement to form an international control board to administer the industrial affairs of that area.

Coal, steel and coke reorganization programs will be continued as previously planned, but the control authority will reside in a body in which the United States, Britain, France and Germany each has three votes and Belgium, the Netherlands and Luxemburg each has one vote. German representation will be by Allied authorities until a German government has been formed.

It is too early to predict whether or not this plan will succeed. However, should international control survive inevitable criticism over an extended period, then closer economic cooperation between Western European countries would be stimulated appreciably. —p. 45

* * *

**NMTBA BROADENS BASE:** As announced in an earlier issue, National Machine Tool Builders' Association has changed its constitution to include in its membership manufacturers of "metal forming machines." A metal forming tool is defined as "a power-driven machine, not portable by hand, used to press, forge, emboss, hammer, blank or shear metal." Not included are die casting machines, extruding machines, rolling mills or welding equipment.

Inasmuch as NMTBA membership previously had been limited to machines which produce parts "by removing metal progressively in the form of chips," the change in eligibility will broaden the base of NMTBA considerably. It is a logical move and one that recognizes the fact that the line of demarkation between "cutting" machine tools and "forming" machine tools has been fading rapidly in recent years. Undoubtedly it will result in a marked increase in membership and in the influence of the association. Also it will make the next machine tool show more representative than any of its predecessors has been. —p. 72

* * *

**ABC OF OPEN HEARTHS:** One of the most important articles in this publication's series on the fundamentals of steelmaking is "Production of Open-Hearth Steel," the first installment of which appears in this issue. The author is L. F. Reinartz, manager of the Middletown-Hamilton Division of Armco Steel Corp., who is one of the outstanding authorities on the subject of open-hearth steel in the world.

In the current installment Mr. Reinartz traces the development of open-hearth steelmaking in the United States from the 5-ton units built in the sixties to the 200 to 225-ton units in operation today. He goes into detail regarding the design and construction of modern furnaces, touching upon bottom, tap hole, front and back walls, roof practice, port construction, slag pockets, fan tails, checker chambers, valves and insulation.

This treatment of furnace design and construction can be recommended highly. It forms an excellent foundation for the discussion of open hearth practice which will appear later. —p. 76

E. L. Shaner

EDITOR-IN-CHIEF

# News Summary

**HOW'S BUSINESS**—First production cutback in the auto industry ascribed to lagging sales (p. 49) suggests the public's appetite for new cars of any make and any price is losing its edge. Other soft spots are appearing on the economic horizon. Ferrous scrap, chronically scarce since the start of the war and buoyant pricewise since the lifting of controls, has softened (p. 35). Jobbing foundries, which encountered a slump in new business last fall, see no improvement (p. 35). An increasing number of end products of the metalworking industries can now be had for spot delivery.

**MATERIALS HANDLING**—An optimistic business note comes from Philadelphia where materials handling equipment manufacturers estimate 1949 volume will be 10 per cent greater than last year (p. 40), and 5½ times the prewar 1941 total. Return of a buyers' market fails to frighten these people; they figure that a competitive market will force closer attention to manufacturing costs and that more plants will be looking for improved materials handling equipment.

**FEDERAL SPENDING**—A record peacetime federal budget (p. 36), both for defense and for other purposes, is not likely to provide substantially stronger support for any diminution in civilian business. Most of the $2.5 billion added to the defense budget will go for pay and subsistence of personnel. Spending for aircraft, the largest single rearmament item affecting the metalworking industries, will be somewhat lower.

**TRAINING MANAGEMENT**—A new program for management development, training and promotion has been instituted by Ford Motor Co. (p. 49). Purpose is two fold: To train present members of management in specific duties; and to select qualified employees for promotion as trainee members of management. The program is designed to provide Ford with adequate executive talent and at the same time enable ambitious and able employees to work up through the ranks to top management posts.

**TRAINING LABOR**—One of the first bills introduced in the 81st Congress provides for the more adequate training of labor leaders (p. 42). Measure would provide funds to establish courses in universities dealing with arbitration techniques, handling of grievances, collective bargaining, parliamentary procedures, labor's responsibility to the community and the principles of social security. Proponents of the plan contend that better trained labor leaders would result in smoother labor-management relations.

**FOREIGN**—Virtual internationalization of the Ruhr under the recent six-nation agreement (p. 45) is hailed by the western powers as a step toward unification of western Europe. The Germans, however, view the program with consternation, believe it will make the great industrial section a political football . . . Elsewhere in Europe, individual states are making progress in surmounting their postwar difficulties and are increasing production and trade. Great Britain has drawn up plans to increase the productivity of its auto industry. Belgium, Luxemburg and France continue to increase ferrous exports. Poland is planning a new 1.5 million ton steel mill. Hungary is spending $65 million to improve its iron and steel industry.

**HERE AND THERE IN INDUSTRY**—Steel production during the last half of 1948 was the greatest for any six-month period in history (p. 38), totaled 45.4 million tons . . . . Private industry will bear the brunt of any future emergency mobilization, a Munitions Board official told the Society of Automotive Engineers (p. 39) . . . . Some machine tool builders are adjusting prices upward (p. 37) . . . . Employers are not required to bargain with supervisory employees under the Taft-Hartley Act (p. 37) . . . . Youngstown Sheet & Tube will spend $16 million for plant improvement this year (p. 52), almost double 1948 expenditures . . . . Mineral production in 1948 is estimated at $15.6 billion, a 26 per cent increase over previous record (p. 46).

*Engineering News, p. 63* *Market Summary, p. 109*

# How You Can "Find"

# 33%

# More Steel

## Squeeze the "DEAD WEIGHT" out of Your Product

By using Inland HI-STEEL instead of ordinary structural steel, you eliminate considerable tonnage which adds only dead weight to your product. HI-STEEL has nearly twice the working strength of ordinary structural steel and 50% greater ability to stand up under impact loads. That's why, with HI-STEEL, it is practical and safe to plan on reducing sectional thicknesses at least 25% in most structural applications. Thus, HI-STEEL gives you the same production with 75% of your steel . . . or, using your entire steel supply, gives you one-third *more* production.

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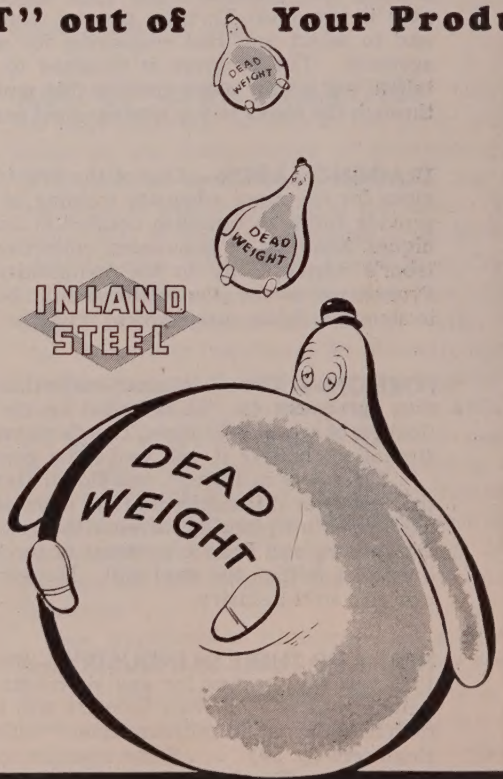
**HI-STEEL meets the requirements of SAE Specification 950**

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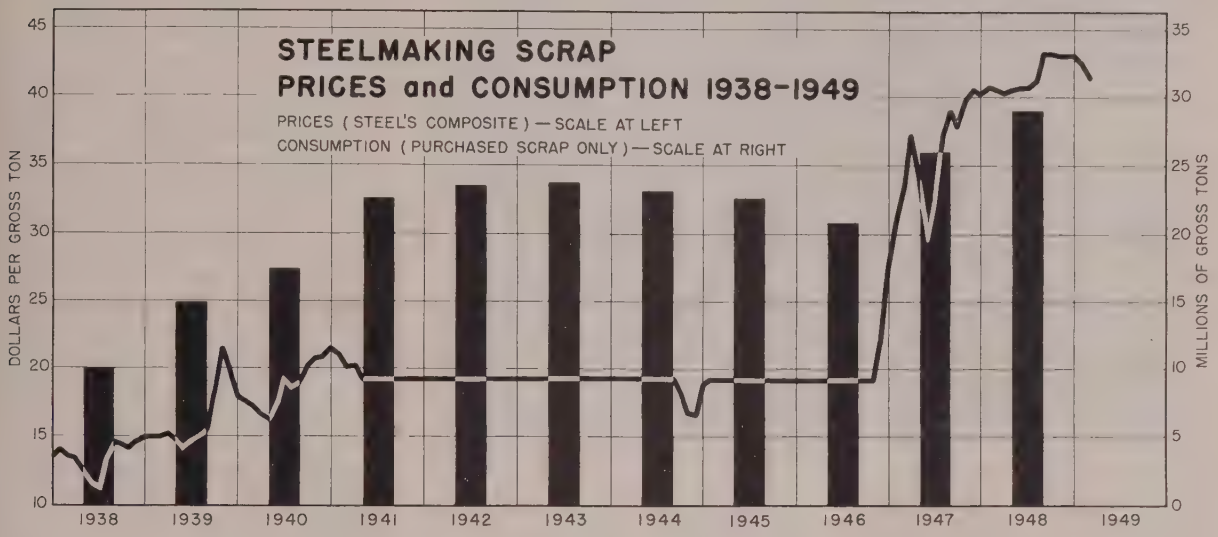
STEEL
A PENTON PUBLICATION




# Is Scrap Entering Buyers' Market?

**Prices take most significant drop in 15 months. Steelmaking grades off $2, and cast material dips even more substantially. Stocks comfortable and buying lags**

FERROUS scrap prices are undergoing the sharpest break since the fall of 1947. Heavy melting material is off $2 or slightly more from the recent formula. Cast grades have dipped even more, with reductions varying up to $5 and $7.50 a ton.

Steelmakers and foundrymen believe prices may fall even more before leveling off.

**Stocks Comfortable** — Steel mills generally have the most substantial scrap stocks they have had for several years. In some cases these amount to 60 days' supplies at near-capacity operations. Fair weather this winter has aided collections, preparation and shipments, while moderate increases in imports of foreign materials have helped ease the shortage that has plagued steelmakers and foundry operators since the beginning of the war.

A slump in foundry operations beginning last fall has lessened the pressure for cast grades. As casting shops decreased their melt, more merchant pig iron became available and foundries generally have increased the ratio of iron used.

**Buyers Cautious**—The weakening in scrap prices has not been accompanied by any spurt in buying by either mills or foundries. Most users, bulwarked by comfortable inventories, prefer to sit back and wait until prices become more stabilized.

Some of the larger mills are discontinuing springboard prices, especially on dealer scrap. Mills are more strict in canceling unfilled orders, as are brokers where shipments have not been coming through on schedule.

Some scrap buyers believe that new efforts will be made to restore price differentials between steelmaking grades as existed before the war.

## Slump in Castings

**Jobbing foundries reduce workweeks, wonder whether decline is temporary or permanent**

JOBBING foundry operators are becoming convinced that the postwar boom has about spent its force—for them. The slump in demand for castings from such shops, which appeared in November and early December, has carried over into January and many operators expect little improvement within the next two months.

Captive foundries of the automotive and heavy industries are more fortunate. Many are working at capacity, expect to continue at a high level.

Some of the smaller jobbing foundries are working a 3-day week and a few have closed down entirely. The average work-week in such shops now is about four days.

Among the hardest hit are suppliers to the machine tool industry and to the manufacturers of household appliances and other consumer durable goods in which demand has eased substantially.

**Still Buying Pig Iron**—Foundries are continuing to take their allotments of pig iron and probably will continue to do so as long as cast scrap prices remain high. However, scrap prices have been easing downward since the foundry slump reduced the demand for scrap.

Some casting shops are accumulating fair inventories of iron. Many are using a greater ratio of iron.

Shops which signed contracts for premium-priced domestic iron or for foreign iron now find themselves embarrassed. While their primary problem at the time the contracts were signed was that of obtaining iron at any price, they now find the cost of using the high-priced material prohibitive in a competitive situation.

**Increase Sales Effort**—Early in the foundry slump, some operators dusted off their sales forces and sent them out to round up supplemental orders. These now are able to hold operations above the average of competitors.

Few are the foundries doing a jobbing business, however, that could not take on additional new business.

Considerable spottiness exists, both among geographic areas and among shops in the same areas.

In the Los Angeles area, gray iron

foundries are operating at about 60 per cent of capacity. Activity has tapered steadily since mid-summer, with some shops shortening the workweek and others closing down entirely during November and December. Upturn expected with the new year has not materialized and foundrymen expect no substantial revival for at least two months.

**Work-Week Shortened**—In Chicago and Milwaukee districts, most jobbing shops are on a 4 to 5-day week, and expect this level to continue for some weeks. Some operators now believe their prices were out of line, due to premium prices paid for materials. Others are suffering because they depended largely on one or two customers. Some shops are experiencing financial difficulties because of slackened business and commitments for premium-priced materials.

Northern Ohio jobbing foundries generally are on reduced work schedules although captive shops are busy. Sales efforts are being increased. Casting prices generally are being held up by high prices for material and labor.

Cincinnati district shops depend largely on machine tool business, which is now spotty, and for heating and sanitary lines. No upturn has developed yet.

**Big Shops Busy**—In Pittsburgh, less than 5 per cent of the volume is done by the small jobbing shops, which are hardest hit. Large foundries serving the railroad and steel mill equipment industry are operating at capacity.

Northern New Jersey and New York city metropolitan district operators report some small improvement following the holidays, although new orders are disappointing in volume. Pig iron allotments are being taken by most shops which intend to increase the ratio of iron in their melt, thereby improving quality and reducing costs.

Philadelphia district operations are averaging about 4 days a week.

New England operators believe the falling off in business is more than a seasonal lull. Large melters for textile machinery makers are maintaining relatively high schedules. Subcontracting, which contributed to the postwar peak loads in jobbing foundries, has fallen off sharply and patterns have been called in.

## Billions for Defense

**But record peacetime budget provides little increase in metal goods procurement**

EXPECTATIONS that large increases in defense procurement would bolster the national economy as demand for civilian goods becomes satisfied are not borne out by the President's budget figures.

Although the defense program proposed for fiscal 1950 is $14.3 billion, a peacetime record and about $2.5 billion more than in fiscal 1949, a major share of the increase will go for pay, subsistence and care of personnel. The armed services will have more money but less strength than provided for in the current year.

**Air Force Cut**—From the metalworking industry's view, the most important defense buying has been in aircraft. The proposed budget cuts the Air Force to 48 groups, as against 66 groups contemplated in the 1949 budget, and 70 groups desired by many congressmen and by the Air Force itself. Current Air Force strength is 59 groups, plus one temporary unit for the Berlin airlift.

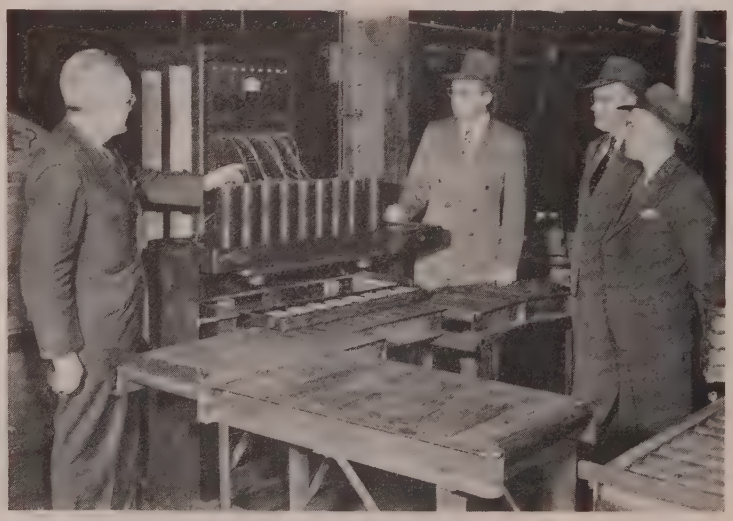
The total allowed for procurement of new Air Force and Navy planes—cash and contract authority—is $2.3 billion. This is $500 million less than for fiscal 1949. The President said the 1950 budget will provide for the procurement of 34 million airframe pounds of new aircraft. Funds voted in 1949 provided for 43 million airframe pounds.

Closely following submission of the budget, the Air Force canceled $300 million in orders for smaller type planes and announced that the funds saved would be used to buy more long-range heavy bombers of the B-36 and B-50 types.

**Stockpiling To Increase**—Funds requested for stockpiling during fiscal 1950 total $525 million, compared with $350 million in the 1949 budget. In addition, $310 million in supplemental authorizations for fiscal 1949 are requested.

During the past three years, $800 million has been authorized for stockpiling. Transfers from war surplus inventories and from Economic Cooperation Administration operations will add materials valued at $700 million by June 30, 1950.

Thus, by the end of fiscal 1950, $2.3 billion will have been authorized for the stockpiling program, against the total objective of $3.7 billion.



TESTS CYLINDER HEADS: This cavitometer, an electrosonic tester to register differences in volume capacities of engine cylinder heads with accuracy of one part in 1500, is the latest application of electrosonics to production of Oldsmobiles. F. M. Poole, left, inventor of the tester, describes its operation to three Oldsmobile executives: D. C. Burnham, manufacturing manager; E. O. Corbin, motor plant inspection superintendent; and L. E. Church, motor plant superintendent

## Pricing Bill Hearings Set

HEARINGS on proposed legislation to clarify pricing policies will open in Washington Jan. 24 before the Senate Trade Policies Subcommittee, of which Sen. Edwin C. Johnson (Dem. Colo.) is the new chairman.

Senator Johnson has introduced a bill to codify and clarify the law and eliminate the confusion surrounding freight absorption. "I do not pretend that it is in perfected form, and constructive criticism is invited. Our subcommittee should like to hear the views of all interested parties on the effect of this bill," he said.

# Few Tool Prices Adjusted

**Minor increases result from altered design details. Opinion mixed as to 1949 prospects**

WHILE some upward price adjustments have been effected in machine tool prices by several builders over recent weeks, there is no indication that a general industry-wide rise is in prospect. A few companies have altered design details affecting accessories, and these have resulted in minor price increases.

At Cleveland it is reported a price advance will go into effect on one line of machines Feb. 1. This follows the reported advance of 3 to 10 per cent recently by another builder. At the same time it was reported at Pittsburgh last week that a reduction of 12 per cent in the price of a small tool lathe has just been put into effect. This lathe was put on the market for the first time six months ago.

**Opinion Mixed**—Opinion is mixed in the market. At Pittsburgh machine tool builders expect a leveling off in new order volume until late February or March, but most interests anticipate fairly active demand throughout the year, although falling short of last year's volume.

Order backlogs for nearly all classifications of tools have been sharply reduced in recent months. Expansion in the steel industry is expected to result in relatively large demand for lathes, shapers, etc.

Metalworking companies have established 1949 budgets for machine tools, but appropriations are not expected for another three or four weeks.

**May Show Uptrend**—Sales trend may show an upturn in 1949, according to L. D. McDonald, president, National Machine Tool Builders' Association, Cleveland. Although the industry is currently operating roughly at about one-fourth the wartime peak, he believes the long term outlook is for increasing demand from manufacturers of consumer goods seeking to lower production costs.

Mr. McDonald expects an upturn in orders under the European Recovery Plan. Also, he feels replacement is not keeping pace with obsolescence.

In the industry, builders and dealers report December business was better than that of November.

BILLETEER: Billet cleaning equipment developed by the Bonnot Co., Canton, and called "billeteers," are shown in operation at the Steel & Tube Division of Timken Roller Bearing Co., Canton, where four units are used. Several billeteers have been shipped to western Europe and three more will be sent overseas this spring

## Taft-Hartley Provision Upheld

CONSTITUTIONALITY of the Taft-Hartley Act's provision that employers are not required to bargain with foremen's unions was upheld last week by the Supreme Court. Court refused to review a challenge to the provision brought by the Foremen's Association of America in a case involving Edward G. Budd Mfg. Co.

National Labor Relations Board had ruled on Jan. 3, 1947, that the FAA was a legitimate labor organization under the Wagner Act and that the Budd company had discriminated against its members and ordered the company to cease interfering with the union.

Then the Taft-Hartley Act supplanted the Wagner Act and employers were relieved of the obligation to bargain with supervisory employees. The Budd company then asked the high court to review the case, which was sent back to circuit court with instructions to consider the effect of the T-H Act on the case.

FAA argued that the section of the Taft-Hartley Act relieving management of the obligation to bargain with foremen was unconstitutional, but the circuit court upheld the section and released the company from the NLRB order. Lower court's decision was upheld by the Supreme Court.

## New Firm Leases WAA Plant

TWO SURPLUS, government-owned facilities at Madison, Ill., operated during the war by General Steel Castings Corp., have been leased by the War Assets Administration to a new company, Western Reserve Steel Corp., Cleveland.

Listed as president of the new company is Harry H. Holloway, who formerly served as the assistant district manager of operations for the Cleveland district of Republic Steel Corp. Listed as treasurer of the new company is M. K. Holloway. Headquarters of the new company are in room 2032, Union Commerce Bldg., Cleveland.

Western Reserve Steel indicated to WAA that it will use the Madison properties for manufacturing oil tubing and allied products, and that it expects to employ approximately 500 workers within the first six months, with a maximum of 3500 at peak operations. The new company also told WAA it expects to install machinery and equipment costing approximately $5 million after spending $750,000 for reconditioning the properties.

## Named OIC Steel Consultant

APPOINTMENT of A. A. Wagner, Pittsburgh, as chief iron and steel consultant to the Office of Industry Cooperation was announced last week by OIC Director Earl W. Clark.

Since last March Mr. Wagner has served as an advisor to OIC on loan from the Jones & Laughlin Steel Corp., Pittsburgh, with which he was associated for 40 years, serving most recently until his retirement, as assistant to the vice president in charge of sales.

# Steel's Record Imposing

**Production during 1948 fell short of all-time record mark by only few days' output**

RECORD peacetime production of 88,509,083 net tons of ingots and steel for castings in 1948 fell just a few days' output short of the all-time production record of 89,600,000 net tons in 1944, data just issued by the American Iron & Steel Institute show.

During the last half of the year the industry turned out more steel than in any other six months in history, second half output amounting to 45,441,805 tons against 43,067,278 in first half.

To produce the record peacetime tonnage, the industry operated at 93.9 per cent of capacity. The first peacetime year in which average operations exceeded the 90 per cent level was 1947.

**October Peak Month** — Open hearths produced 89.6 per cent of the 1948 total output. The peak month of production was October, when more than 7,987,000 tons were turned out, with operations averaging 100 per cent of capacity. The peak quarter of the year was the closing three months, when 23,521,563 tons were produced, with operations averaging 99.3 per cent of capacity.

December production totaled 7,755,839 tons, with operations averaging 97.4 per cent of capacity.

Industry capacity at the beginning of this year is estimated at 96 million tons, an increase of 1,800,000 over that available at this time a year ago, and 18 per cent greater than in 1940.

## Steel Product Shipments Dip

NEW SHIPMENTS of steel products declined to 5,732,256 tons during November from 5,952,008 tons in October, representing a decline of about 925 tons per day, according to the American Iron & Steel Institute. In addition to these tonnages, 572,705 tons and 617,817 tons were shipped during the respective months to members of the industry for conversion into further finished products or for resale.

This brought net shipments for the first 11 months to 59,915,371 tons compared with 57,523,829 tons for the like 1947 period, while shipments to other members of the industry totaled 6,285,936 tons and 5,056,323 tons, respectively.

Efforts of the industry to satisfy continued heavy demand for railroad supplies, tubular products and wire were reflected in the November report. Although shipments as a whole declined, those of standard rails increased in November to 175,407 tons from 173,433 tons in October; tie plates, to 39,234 tons from 38,207; butt weld pipe, to 185,891 tons from 183,840; and drawn wire, to 258,482 tons from 240,734.

## Steel Ingot Production Statistics

| | Estimated Production—All Companies | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Open Hearth | | Bessemer | | Electric | | Total | | Calculated weekly | Number of weeks |
| | Net tons | Per cent of capac. | Net tons | Per cent of capac. | Net tons | Per cent of capac. | Net tons | Per cent of capac. | production Net tons | in mo. |
| 1947 | | | | | | | | | | |
| 1st 6 mos. | 38,328,096 | 95.4 | 2,177,701 | 85.2 | 1,832,760 | 72.8 | 42,338,557 | 93.5 | 1,636,589 | 25.87 |
| 2nd 6 mos. | 38,545,697 | 94.4 | 2,054,842 | 79.1 | 1,954,975 | 76.4 | 42,555,514 | 92.6 | 1,619,928 | 26.27 |
| Total | 76,873,793 | 94.9 | 4,232,543 | 82.1 | 3,787,735 | 74.6 | 84,894,071 | 93.0 | 1,628,195 | 52.14 |
| 1948 | | | | | | | | | | |
| Jan. | 6,768,497 | 95.5 | 343,169 | 77.5 | 361,110 | 79.0 | 7,472,776 | 93.6 | 1,686,857 | 4.48 |
| Feb. | 6,245,338 | 94.3 | 340,596 | 82.3 | 354,270 | 82.9 | 6,940,204 | 93.0 | 1,676,378 | 4.14 |
| Mar. | 6,841,578 | 96.6 | 363,235 | 82.0 | 403,322 | 88.2 | 7,608,135 | 95.3 | 1,717,412 | 4.43 |
| 1st qtr. | 19,855,413 | 95.5 | 1,047,000 | 80.6 | 1,118,702 | 83.4 | 22,021,115 | 94.0 | 1,693,932 | 13.00 |
| Apr. | 5,640,168 | 82.2 | 185,089 | 43.2 | 392,900 | 88.7 | 6,218,157 | 80.4 | 1,449,454 | 4.29 |
| May | 6,799,289 | 96.0 | 355,562 | 80.3 | 416,801 | 91.1 | 7,571,652 | 94.8 | 1,709,177 | 4.43 |
| June | 6,481,879 | 94.5 | 356,810 | 83.2 | 417,665 | 94.3 | 7,256,354 | 93.8 | 1,691,458 | 4.29 |
| 2nd qtr. | 18,921,336 | 90.9 | 897,461 | 69.0 | 1,227,366 | 91.4 | 21,046,163 | 89.7 | 1,617,691 | 13.01 |
| 1st 6 mos. | 38,776,749 | 93.2 | 1,944,461 | 74.8 | 2,346,068 | 87.4 | 43,067,278 | 91.9 | 1,655,797 | 26.01 |
| July | 6,346,423 | 89.8 | 324,991 | 73.6 | 395,610 | 86.7 | 7,067,024 | 88.7 | 1,598,874 | 4.42 |
| Aug. | 6,631,157 | 93.6 | 371,205 | 83.8 | 435,246 | 95.2 | 7,437,608 | 93.1 | 1,678,918 | 4.43 |
| Sept. | 6,592,226 | 96.3 | 387,153 | 90.5 | 436,231 | 98.7 | 7,415,610 | 96.1 | 1,732,619 | 4.28 |
| 3rd qtr. | 19,569,806 | 93.2 | 1,083,349 | 82.5 | 1,267,087 | 93.5 | 21,920,242 | 92.6 | 1,669,478 | 13.13 |
| 9 mos. | 58,346,555 | 93.2 | 3,027,810 | 77.4 | 3,613,155 | 89.4 | 64,987,520 | 92.1 | 1,660,386 | 39.14 |
| Oct. | 7,118,299 | 100.5 | 409,545 | 92.5 | 459,268 | 100.4 | 7,987,112 | 100.0 | 1,802,960 | 4.43 |
| *Nov. | 6,920,747 | 100.9 | 411,049 | 95.9 | 446,816 | 100.9 | 7,778,612 | 100.6 | 1,813,196 | 4.29 |
| †Dec. | 6,916,974 | 97.9 | 393,609 | 89.1 | 445,256 | 97.6 | 7,755,839 | 97.4 | 1,754,715 | 4.42 |
| 4th qtr. | 20,956,020 | 99.7 | 1,214,203 | 92.4 | 1,351,340 | 99.6 | 23,521,563 | 99.3 | 1,790,073 | 13.14 |
| 2nd 6 mos. | 40,525,826 | 96.5 | 2,297,552 | 87.5 | 2,618,427 | 96.6 | 45,441,805 | 96.0 | 1,729,798 | 26.27 |
| Total | 79,302,575 | 94.8 | 4,242,013 | 81.2 | 4,964,495 | 92.0 | 88,509,083 | 93.9 | 1,692,982 | 52.28 |

* Revised. † Preliminary figures subject to revision.

For 1948, percentages of capacity operated are calculated on weekly capacities of 1,599,286 net tons open hearth, 99,962 net tons bessemer and 103,228 net tons electric ingots and steel for castings, total 1,802,476 net tons; based on annual capacities as of Jan. 1, 1948, as follows: Open hearth 83,610,690 net tons, bessemer 5,226,000 net tons, electric 5,396,770 net tons, total 94,233,460 net tons.

# Allocations Extended

**Commerce Department continuing various steel programs. Expects Congress to act on law**

REGARDLESS of what action Congress takes with respect to allocation of scarce raw materials, it appeared certain last week no substantial change in allocation of steel to so-called critical industries was in prospect. From all indications the present voluntary allocation machinery is going to continue as in past months even though Public Law 395, under which it operates, is scheduled to expire Feb. 28.

Acting on the assumption Congress will extend the law, or replace it with a new measure which will provide for allocations, the Department of Commerce is continuing its allocation activities. Last week, the Steel Products Advisory Committee to the Office of Industry Co-operation approved two new programs, extended several others, and increased tonnage allotments to several.

**Approves Grain Bins**—It approved allocations of 8400 tons of steel monthly for farm type grain storage bins, beginning Mar. 1. It also approved the anthracite program and increased its tonnage allotment from 2570 tons monthly to 3130 tons. The mining machinery program also was approved and its tonnage allotment increased from 26,400 tons monthly to 31,785 tons. The oil field tank program was extended.

Requirements for oil country goods were discussed by the committee but action was deferred for the present. It also considered requirements for rails, flues and tubes but action was deferred pending report of a special committee to be set up to study the proposal. Also it was suggested a committee be set up to review housing requirements and bring all such into one program.

**Approved By Sawyer**—Early last week it was announced that Commerce Secretary Sawyer and Attorney General Clark had approved the programs covering mining machinery and steel for special manganese ore carrying cars.

Under these two programs 31,785 tons of steel monthly will be provided for production of mining machinery and repair parts, and 2576 tons monthly will be shipped the Canadian Car & Foundry Co. for the manufacture of ore cars to be used by the Union of South Africa Railways for transporting manganese ore from South African mines to tidewater.

# SAE Meeting Given Defense Data

**Private industry is backbone of defense, speaker tells annual convention of automotive engineers. Need for steel specifications in terms of end-use stressed**

PRIVATE industry must bear the brunt of mobilization in case of an emergency, Lt. Gen. Leroy Lutes, director of staff, Munitions Board, told a capacity audience at the annual meeting of the Society of Automotive Engineers at Book-Cadillac Hotel, Detroit, last week.

Revealing pertinent facts and figures as to the state of the defense program, General Lutes declared standby reserve plants and those sold subject to recapture would serve only to give a "running start." At present, he said, 77,000 war surplus tools of World War II vintage are in government storage. An additional 40,000 machines lately have been tagged for this reserve and are to be made available to the Army, Navy and Air Force.

**Plant Survey** — General Lutes stated a facilities allocation survey, now being pushed vigorously, will cover about 25,000 plants representing 90 per cent of the productive capacity of the United States. On the basis of this survey tentative production schedules on specific items will be set up so that management of these privately owned plants can in turn set up their schedules on raw materials, power, equipment, subcontracting arrangements, and similar matters.

One of the most heartening remarks made by the general was the following: "We of the Munitions Board are convinced that through standardization the 12,000 separate specifications which existed in World War II can be reduced to less than 8000."

As usual during meetings of the 43-year-old SAE, a tremendous range of activities was covered throughout the five days of sessions from Jan. 10 to 14. Attendance totaled 3500 at the various sessions. There were about 40 formal papers covering practically all engineering phases of vehicles of sea, air and earth—in other words everything from tractors to aircraft, with growing emphasis on the latter.

In addition to the general sessions, 60 committee meetings were held on subjects ranging all the way from riding comfort research to suppression of traffic noise.

**Automobile Design**—Much interest was aroused by the statement by L. C. Goad, vice president, General Motors Corp. and head of the Fisher Body Division, to the effect that plans, which his company now is pushing through, will invalidate the rising tide of criticism crystallized in the oft-repeated statement that automobile design has gotten into a bottleneck of sameness.

"Now that competition again is developing," said Mr. Goad, "artistry and individuality of design will become a more important factor in capturing the market."

Materials and production methods came in for much attention. Charles M. Parker, secretary, committee on manufacturing problems, American Iron & Steel Institute, urged designers to order steel on the basis of end-use rather than arbitrary chemical composition.

**Specific Ordering**—"The most equitable method, both to consumer and producer, is to request the steelmaker to furnish steel suitable for the making of a specific part—the consumer setting forth the fabrication methods available to him. However, this is true only if the steel buyer has well rounded knowledge of steel manufacture and if the steel producer in turn has intimate knowledge of the consumer's plant and processes—conditions which both users and producers will do well to cultivate."

STANWOOD W. SPARROW

Among the production papers, one of the most interesting was that by C. L. Stevens and Gustav Bennerholm on hot extrusion forging methods at Ford Motor Co. This is dealt with in this issue on page 72.

**Hoffman Is Guest Speaker**—Guest speaker at the annual SAE dinner on Wednesday evening was Paul G. Hoffman, administrator, Economic Cooperation Administration. Introduced by Robert F. Black, president, White Motor Co., Cleveland, Mr. Hoffman spoke on "Recovery—the Road to Peace."

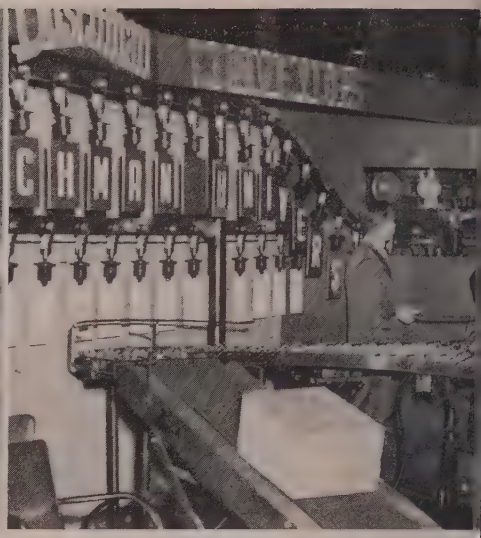
He gave encouragement to the machine tool industry when he indicated the ECA program rapidly is being switched from temporary relief to permanent rehabilitation demanding tools and machinery by means of which the people abroad can work out their own salvation through industrial recovery which will lift the load off our shoulders as far as food, clothing and other consumer goods are concerned. It is a sign of the times that exports of metalworking machinery already are beginning to improve.

**New Officers**—New national officers of SAE introduced at the annual dinner are: President, Stanwood W. Sparrow, who is vice president in charge of engineering, Studebaker Corp., South Bend, Ind.

Councilors—G. E. Burks, chief engineer, Caterpillar Tractor Co., Peoria, Ill., N. H. Daniel, manager, Diesel Engine Division, General Motors Products of Canada Ltd., Oshawa, Ont., and E. A. Ryder, consulting engineer, Pratt & Whitney Aircraft, East Hartford, Conn.

Vice presidents—Air Transport, R. C. Loomis, Consolidated Vultee; aircraft, Dr. Karl Arnstein, Goodyear Aircraft Corp.; body, Frank S. Spring, Hudson Motor Car Co.; diesel engine, Max M. Roensch, Ethyl Corp.; engineering materials, H. B. Knowlton, International Harvester Co.; fuels and lubricants, H. L. Moir, Pure Oil Co.; passenger car, George B. Allen, Chrysler Corp.; production, L. C. Goad, General Motors Corp.; tractors and farm machinery, L. A. Gilmer, Oliver Corp.; transportation and maintenance, J. L. S. Snead Jr., Consolidated Freightways Inc.; truck and bus, E. P. Lamb, Chrysler Corp.

B. B. Bachman, vice president, Autocar Corp., Ardmore, Pa., was re-elected treasurer, and John A. C. Warner, secretary and general manager of the society, with headquarters at 29 West 39th St., New York.



# Handling Equipment Makers See Banner Year

**Expect volume to increase 10 per cent in 1949 to total of $1.1 billion, 5½ times prewar volume. Export may take larger share. Return of competitive market seen increasing demand for cost-cutting equipment**

MATERIALS handling equipment sales in 1949 will set a new high record of $1.1 billion, representing an increase of 10 per cent over the previous peak of $1 billion established in 1948.

Demonstrating the growth of the materials handling industry, the 1949 volume will be more than five times the $200 million business done in the last prewar year —1941.

These estimates were made last week by Sam W. Gibb, president of the Material Handling Institute, and general sales manager of Yale & Towne Mfg. Co.'s Philadelphia Division, in conjunction with the materials handling industry's most successful show held in Convention Hall at Philadelphia.

Mr. Gibb's estimates incorporate some 50 basic types of handling equipment, including industrial trucks, hoists, conveyors, cranes and the like. Last year, about 12 per cent of the total volume was exported. Next year, the percentage may run as high as 15 per cent due to European recovery spending.

In producing this equipment, the industry will purchase such materials as ferrous and nonferrous metals, and parts such as motors, switches, bearings, gears etc., totaling about 35 per cent of the sales volume or an outlay of $385 million.

**Outlook Bright**—Observations made by many of the 225 exhibitors queried at the Materials Handling Exposition supported the rosy picture represented by the above figures. No one in the industry anticipates a business slump soon. Many, however, believe a buyer's market is in the making, and welcome it.

**Books Still Show Orders**—Backlog of orders for many of the truck makers is not much over 3 months. For some of the smaller basic types of equipment such as pallets, hand trucks and standard or "off-the-shelf" conveying units, orders are disposed almost as received. On the other hand, backlog orders for some types of "tailor-made" equipment is as much as a year.

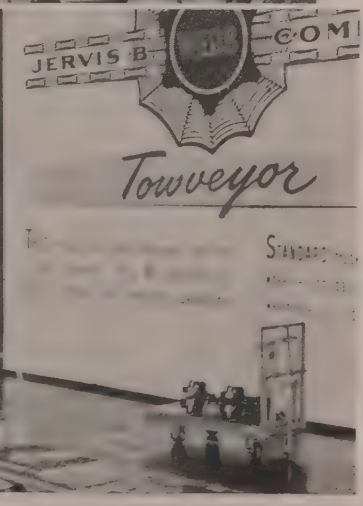
**Significant Trend**—Generally, prices on most types of handling equipment displayed before the more than 22,000 visiting the Materials Handling Exposition & Conference—sponsored by the Material Handling Institute and American Society of Mechanical Engineers —are expected to be stabilized at present levels.

**Industry's Growth**—Several factors are mentioned as instrumental for the phenomenal growth of this industry to billion-dollar volume. Among them, the war and user education are the most prominent. Undoubtedly, the industry's biggest "shot-in-the-arm" stemmed from meeting the tremendous materials movement schedules demanded by World War II. This experience also can be termed as part of the user educational pattern, forming and expanding with cost-cutting realizations derived from "sample" tryouts of various handling devices. Of late, added stimulus to the educational end is being provided by the Material Handling Institute through its activities in organizing American Material Handling Society chapters in various cities of the nation. To date nine such chapters are in full operation and another is expected to be formed shortly.

**At the Show**—Engineering-wise, the trend in handling equipment as observed at the Philadelphia exposition not only is toward taking the load off human labor in picking up and moving materials around, but also toward simplification and maneuverability. This was evident from the many industrial trucks exhibited for the first time with automatic transmissions—including magnetic induction, fluid and hydraulic drives. Even some of the 2-wheel hand trucks displayed included light motors for propulsion and hydraulic devices for lifting or tilting loaded units to pushing position.

At the annual convention banquet, Wednesday evening, Col. S. Douglas Gibson, chairman of the award committee for the Material Handling Institute, awarded Clark Equipment Co., Battle Creek, Mich., a plaque for the outstanding exhibit at the show.

*Shown here are some typical exhibits seen by the thousands of visitors to the Third National Materials Handling Exposition held last week in Philadelphia's Convention Hall. Equipment displayed ranged from small hand trucks and conveyors to massive mobile cranes for handling materials in outdoor storage. As shown by the map, local groups are being organized across the nation for more scientific study of materials handling problems*



# Windows of Washington

By E. C. KREUTZBERG — *Washington Editor, STEEL*

**Eighty-first Congress gives early evidence it will not "rubber stamp" Truman's "fair deal" program, estimated to cost additional $20 billion annually**

PROCEEDINGS to date of the 81st Congress have aroused suspicions in Washington that President Truman may have been a little overconfident when he concluded his State of the Union message by saying: "In the months ahead I know that I shall be able to co-operate with this Congress." Hardly had the sound of his voice died away when evidence began to accumulate that this Congress, as usual, is composed of men and women representing every shade of political opinion in the nation. While it still is conceded that President Truman will get from Congress a lot of what he wants, he will encounter rugged opposition on some of his proposals. This will be far from a rubber-stamp Congress.

Most important development is the action of the Democratic leadership in revising Democrat-Republican representation on a number of important Senate committees from 7-6 to 8-5. Committees so affected are Labor, Banking and Currency, Foreign Relations, Agriculture, Judiciary, Rules, Commerce and Public Works. What this will do to the bipartisan policy of the last two years on numerous matters, including particularly foreign policy, remains to be seen. But it has brought one significant result; it has drawn the Republicans more closely together, with resulting increment to their strength as the minority party.

**GOP Leaders Irked**—The Democrats, in an understandable flush from the resounding victory of last November, have been at fault in other ways. For example, in reintroducing the famous public housing bill first known as the Wagner-Ellender-Taft and then the Taft-Ellender-Wagner bill, Senator Ellender ignored the minority leader and put it in as a 100 per cent Democratic measure, with Senators Wagner, Maybank, Sparkman, Myers, Hill, Pepper and Long as the co-sponsors.

In short speeches, Senators Vandenberg and Taft have indicated their resentment over these slights—the former over reduction in the Republican representation on the Foreign Relations Committee and the latter over failure to submit the housing bill again as a bipartisan measure.

**Fumble T-H Repealer**—One of the interesting situations in the opening days is the fumbling approach by the Democrats to deliver on the President's request for repeal of the Taft-Hartley Act and re-enactment of the Wagner Act with "certain improvements." In offering his bill, Sen. Elbert Thomas (Dem., Utah), new chairman of the Senate Labor Committee, stated some changes may be necessary in the bill; "repeal of the Taft-Hartley Law," he said, "will call for other legislation . . . which may be worked out as amendments to the National Labor Relations Act as it stood before the Taft-Hartley Law." The inside fact is that Secretary of Labor Tobin is having a difficult time in writing a measure satisfactory to all labor camps. The CIO wants the Wagner Act back in its original form as far as possible. Though the AFL has gone on record as favoring re-enactment of the Wagner Act, the AFL really would like to see both acts thrown out the window. So the chore of drawing up a satisfactory compromise is proving a difficult one.

**No Early Action on Steel Expansion**—Several congressmen contacted by STEEL believe there is no likelihood of action at this session to authorize a government steelworks program. What is expected is that Senator Murray will head a study and submit a proposal late in the session for a program authorizing the government to: (1) Loan money at low interest and with fast amortization for steelworks expansion; and (2) build steelworks plants with taxpayers' money under certain conditions. Opinion is that the proposal is in several respects counter to the currently prevailing philosophy in regard to free enterprise and hence would not be approved hastily. On the other hand, the fate of this proposal will depend to a substantial extent on the relationship of steel supply to demand at the time the matter comes up for a conclusion.

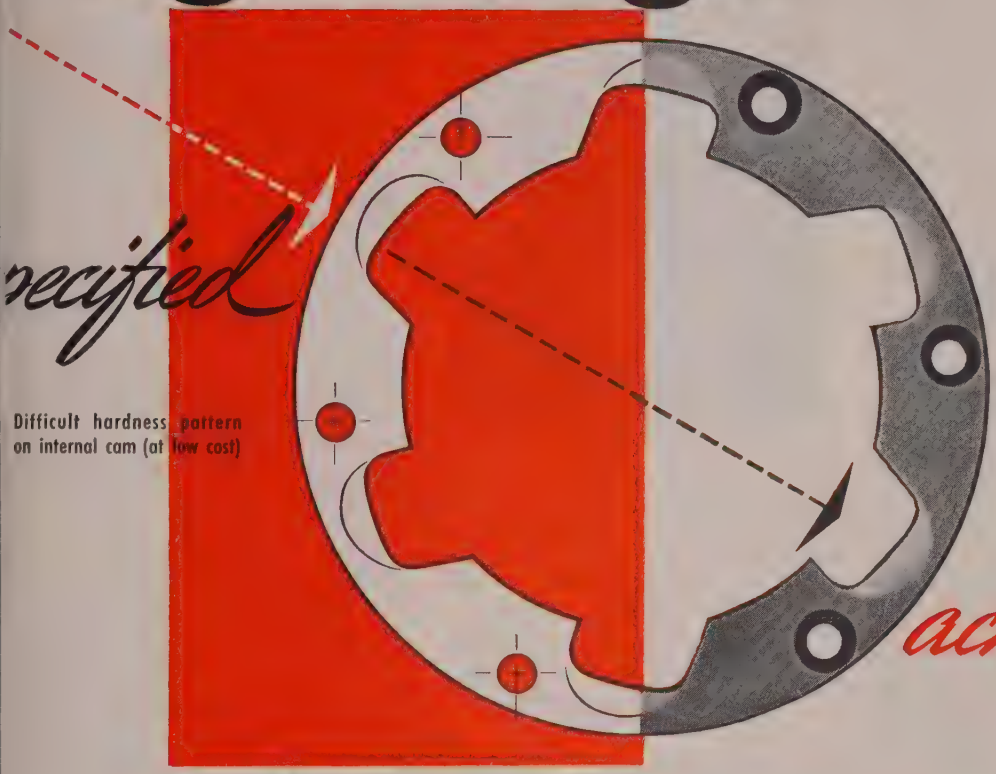
**$20 Billion Program**—In the meantime, students of fiscal affairs in Washington are appalled at what would happen to the national budget should Congress turn to and at one fell swoop grant all that the President has asked. One economist who makes it a point to think through on these matters says that it probably would require about five years after enactment before the full effects became apparent; after that the program would require an increase in the national expenditures of around $20 billion a year, he figures. In this calculation he includes all such items as expanded social security, increased cost of farm price support, the public housing program, free medicine, reclamation, etc. He has not included, he says, the cost of whatever measures the President might demand in support of his contention that "our first great opportunity is to protect our economy against the evils of boom and bust."

On one thing all hands agree: This is going to be not only an exceedingly interesting Congress, productive of a vast amount of news, but its actions in accepting or rejecting Presidential requests are going to influence the shape of national policies for a long time to come. Under the circumstances it is fortunate that there is a strong minority to insure thorough debate and prevent precipitate action.

## Would Train Labor Leaders

FIRST major bill to be offered in the 81st Congress toward the goal of building a bigger and better Labor Department is that left over from the last Congress which would establish a Division of Labor Education. Introduced in the Senate by Sen. Elbert Thomas (Dem., Utah) and in the House by Rep. Ray Madden (Dem., Ind.), it has a number of Republican co-sponsors. The labor unions are solidly in support of the measure and are pushing it through the National Committee for the Extension of Labor Education, 1508 Seventeenth street N. W., Washington. Chairman of this lobby is Hilda M. Smith. Vice Chairman is Frank Fernbach of the United Steelworkers - CIO. Treasurer is Marion Hedges, formerly of the Brotherhood of Electrical Workers—AFL and now on the labor staff of the Economic Cooperation Administration.

While the bill does not include an appropriation provision, the plan calls for use of $10 million federal funds a year—to be increased after the start has been made—in stimulating labor education all over the country. The states would contribute $25 for each $75 spent by the federal government, and the money would be allotted to universities and other educational institutions to help them de-



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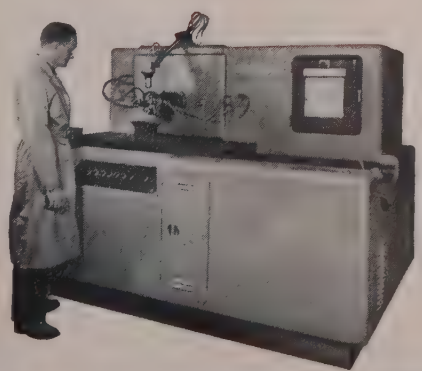

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fray the cost of conducting labor educational courses.

The whole idea springs from an educational move launched several years ago by Vincent Sweeney of the USA-CIO with the approval of Philip Murray, which resulted in instruction of hundreds of USA officials in 1 and 2-week summer courses at Penn State College. Since then other unions have adopted the idea and several thousands of union men have received courses of instruction.

The plan calls for instruction, in the main, in non-controversial subjects. So far the courses set up for union men have taught arbitration techniques, grievance procedure and other angles of collective bargaining; such subjects as parliamentary procedure, labor's responsibility in the community, the principles of social security and workmen's unemployment compensation have been prominently featured. The aim is to make such instruction a salient part of the training of all young Americans so as to make for smooth labor-management relations.

## Advertising Prospects Bright

BUSINESS representatives in Washington believe 1949 is going to be a good year for the advertising business. Production has caught up with or exceeded demand in many lines, with the result that advertising will be used increasingly to promote sales.

This is the case with the petroleum industry whose production now is well ahead of consumption. It also is the case with the automobile industry. Most automobile manufacturers are planning to produce more vehicles in 1949 in the expectation of being able to obtain more steel and, with order backlogs showing shrinkage, they are getting ready once more to employ real selling methods. The same thing is true of several leading household durable goods items whose production is now considerably ahead of sales.

## Science Staff Abandoned

LAST remaining technologist on our once-ambitious Science Staff in London, Dean Willis R. Woolrich of the College of Engineering, University of Texas, is preparing to return to the United States. That will mark the end of a unit set up in our London embassy in 1947 to monitor and report on new scientific research and development results in the United Kingdom and western Europe.

State Department, sponsor of this service, has been forced to abandon, at least temporarily, this science observation post because of the severe slash in its foreign service appropriation at the hands of Congress in 1948. Efforts are being made by the State Department to obtain funds from some of the government agencies that benefit from the service, but so far without avail. A number of technical associations have desired to co-operate by furnishing observers specially trained to report on metals developments in Britain and on the continent; these included the American Society for Metals and the American Foundrymen's Association. Data obtained by the science staff has been made available to United States citizens at nominal prices by the Office of Technical Services, Commerce Department.

DEAN ACHESON

*Selection of Mr. Acheson to succeed George Catlett Marshall as secretary of state is receiving general approval in Congress and in the press. As under-secretary from 1945 until June, 1947, Mr. Acheson helped form the present foreign policy of the department, was an early advocate of the aid for Europe program and since the war has supported a tough policy toward Russia*

## Coal Study Underway

FULL-SCALE study of one of the principal bottlenecks in the way of iron and steel production—coking coal reserves—now has been well organized by the Bureau of Mines, whose officials feel that there is plenty of coal in the country which can be used for coking purposes by developing more "know-how." The study is a double-barreled one and consists of a survey of our coal reserves together with an investigation of the possibilities of upgrading poorer coal so that it can be used for coking, or blended with high-grade coking coal.

The survey at the beginning is confined to the Appalachian region and is being conducted by six field crews. Washing and general upgrading methods will be studied at a newly equipped plant at the bureau's Pittsburgh experiment station, and at laboratories at Tuscaloosa, Ala., and Seattle, Wash. The project has been set up as a 5-year program for which $100,000 has been set aside as a starter in the current fiscal year. The bureau hopes to be in a position to report definite gains from the study by the coming summer.

Later the survey will be extended to all other coal areas of the country. As a matter of fact, the bureau now is in process of setting up a final estimate of the Gunnison county region in western Colorado where its explorations unearthed huge quantities of coking coal.

## "Atomic Clock" Developed

UNVEILING of the latest achievement of the Bureau of Standards—a so-called "atomic clock"—reveals a development of interest to all industries in which accuracy of time is important. The clock, invented by Dr. Harold Lyons, is expected to find its first practical use in regulating radio broadcasting frequencies so that new channels may be assigned in the crowded radar-television spectrum. The frequency drift now allowed will be unnecessary, since the new clock will permit monitoring down to much lower plus and minus tolerances.

Bureau officials believe also the the new invention will prove "an invaluable tool" for research in "medicine, physics, engineering and chemistry."

The atomic clock is based on a brand-new time standard. This is the vibration of a nitrogen atom inside a molecule of ammonia gas. This standard, it was explained, "will never deviate by the minutest fraction of a second, as long as creation lasts." Its maximum possibility of error was reported as a tenth of a millionth of any period measured—as an hour, a day, a year or a century. Clocks depending on the rotation of the earth as the standard, it was explained, are subject to substantial percentages of error due to tendency of the rotating movement to slow down and due to yearly variations whose reasons are not understood by astronomers.

# More Unity for Western Europe?

**New policy which may internationalize the Ruhr, plus revived foreign trade which could break national boundaries, seen by some as portents for eventual U. S. of Europe**

SIGNS and portents presaging an eventual United States of Western Europe have been seen in recent economic and industrial developments.

The United States, Britain, France, Belgium, the Netherlands and Luxemburg, participants in the new agreement which will virtually internationalize the Ruhr, foresee in this action a step toward closer European economic co-operation, an interpretation the Germans vehemently deny. In some quarters hope is expressed that Europe's reviving industry, long cramped by artificial international boundaries, may at last transcend frontiers, partly by means of greatly increased foreign trade.

## Western Germany

RECENT London decisions to form a six-nation control board for the Ruhr have been received with consternation by the Germans. Ruhr coal, steel and coke reorganization programs will be continued as formerly outlined, but the general control authority, originally to consist of U.S., British, German and French members, will now be made up of members from the same countries, plus Belgium, the Netherlands and Luxemburg. The first four nations will have three votes each on the authority. The other three will have one each. Decisions will be by a simple majority of eight votes, except on certain issues when 12 votes will be necessary. German representation will be by Allied authorities until a regular German government is formed.

German public opinion holds that this agreement makes the Ruhr a political football, that the area never again will be able to achieve its production potential and that the economic vacuum thus created will throw the entire European economy and recovery out of balance. Industrialists view with alarm the 10.7 million ton ceiling imposed on steel output by the agreement. The area, if dismantlings were stopped and some repairs made, could produce twice this amount. Dismantlings, however, have not stopped, and foreign financial investments in Ruhr industry, seen as a possibility a short time ago, now appear very unlikely. Under this new set-up, German opinion holds, the nation is in danger of becoming a permanent ward and liability to the United States.

## Belgium, Luxemburg

WHATEVER the ultimate effects on European unity made by the Ruhr agreements, the Belgo-Luxemburg union continues to prosper economically. In October exports of iron and steel products passed all previous monthly records, shipments attaining 362,571 metric tons, compared with the previous record in September of 332,693 tons.

The largest tonnage in October went to Argentina, but currency difficulties are expected to curb these shipments until new financial arrangements can be made. Shipments to Great Britain increased by 22,000 tons to 47,756, and the United States received 28,711 tons, 17,000 more than in September.

Belgian trade with the Netherlands, Denmark, Norway and Egypt now has a satisfactory outlook. Exports to France have been snagged by more currency difficulties.

## France

DESPITE her many problems, France was able to boost iron and steel exports during 1948, total shipments for the year being estimated at 600,000 metric tons.

Demand from the United States for French steel is increasing. Lorraine mills have booked contracts for 30,000 tons of rails and some tonnage of structural steel from American buyers. Prices range from $100 to $105 per metric ton f.o.b. to jobbers, and from $105 to $110 to direct consumers.

An additional 45 billion francs—approximately $150 million at the "free market" rate of exchange—has been released from the French counterpart fund, Economic Cooperation Administration has announced. Fifteen billion francs will be used to continue French reconstruction projects, for which 85 billion have already been released during the past year. The 15 billion francs are divided as follows: 8 billion for hydroelectric development, 5 billion for coal mine modernization, 0.7 billion for coke plants, 1.3 billion for electrification of railroads. Five billion francs will be used for the exploration for and development of scarce materials, mainly in French overseas territories. The remaining 25 billion will be used to reduce the level of advances of the Bank of France to the state.

## Great Britain

GREAT BRITAIN'S automobile industry has drawn up plans for greater productivity.

Austin, Ford, the Nuffield group, the Rootes group, Standard and Vauxhall, makers of about 90 per cent of the British cars, have agreed to use common accessories and components. The manufacturers of busses and coaches have also taken steps to standardize the dimensions of their chassis. Basic designs are not affected and differences of style will still be possible. The basic plan of the automobile industry will be made available to all sections of the engineering trades. Another part of the productivity program provides that all car and commercial vehicle manufacturers will agree to make available to the 600 member firms of the Society of Motor Manufacturers and Traders, for inspection by such members, their plants and their technical and administrative resources.

The steel nationalization bill continues to grind through parliamentary procedure. Currently, it is with the Standing Committee in the House of Commons, and it has been subjected already to numerous proposed amendments by the opposition, dealing mainly with the central organization which would administer the nationalized industry.

## Czechoslovakia

EXPORTS of iron and steel and metalworking products now constitute an important part of Czechoslovakia's foreign trade. It is estimated that iron and steel exports now account for 35 per cent of the total, as compared with 23.2 per cent in 1947 and 10.9 per cent in 1937.

## Hungary

HUNGARY is devoting more than $65 million to capital improvement to its iron and steel industry, which is to be developed over a three-year period. Last year the nation produced more iron and steel than in 1938, the output of raw steel being estimated at 840,000 net tons, and that of pig iron at 392,000 tons.

## Poland

A SIX-YEAR plan of development to commence in 1950 has been prepared

which will double the present rate of iron and steel production which is estimated at 2,016,000 net tons of ingots and castings. A steel mill with an annual capacity of 1,500,000 tons is reported to be supplied by Russia. These developments are to take place in central and eastern Poland near the Russian border.

## Grant Chile Steel Plant Loan

ADDITIONAL loan of $20 million to Corporacion de Fomento for completion of a steel mill project at Concepcion, Chile, last week was approved by the Export-Import Bank of Washington.

The additional credit will cover price increases on purchases in this country, and certain installations not originally planned. Total cost of the plant will be around $83 million. Engineering phase of the project will be completed next year. Most important equipment is on order, and some of it already has been shipped to the South American nation.

It is planned to have several units of the plant, such as the pipe mill and the sheet and tin mill, in operation next year. Possibly the blast furnace will go into operation toward the close of this year. The entire plant, with capacity of approximately 250,000 tons of steel products, should be completed during the first half of next year.

Bethlehem Chile Iron Mines will supply ore from its Tofo and Romeral properties. Coal will be purchased from the Lota and Schwager companies.

These raw materials will be shipped in vessels owned by the Chilean Steamship Lines and the Schwager Co. Limestone will be obtained from deposits owned by Cia. de Acero, and power will be supplied by the Abanico power plant.

The steel project will be owned and operated by Cia. de Acero del Pacifico, which was organized under the auspices of Corporacion de Fomento.

## Opposes Bearing Tube Tariff Cuts

AMERICAN producers of bearing tubing will eventually be forced out of business as the result of Swedish competition if proposed tariff reductions on this product are approved, according to Edward A. Livingstone, vice president of Babcock & Wilcox Tube Co., who recently testified before the Tariff Commission.

Mr. Livingstone pointed out that in the United States today, there are only three firms making such tubing for ball bearings—Babcock & Wilcox, Timken Roller Bearing Co. and National Tube Co., subsidiary of U. S. Steel Corp. Reason for this, he said, is that Swedish low-priced exports of the product into this country before the war, had forced domestic prices to a level where it was no longer profitable for any American producers to compete. During the war, the U. S. was forced to boost domestic production, some of which was accomplished through private financing of equipment needed for this type of manufacturing.

Mr. Livingstone went on to testify that Sweden, which since the war has been concentrating on other production, will soon be able to resume bearing tube exports into this country. If the tariff on this product were reduced, he said, the competition would be ruinous, would leave America dangerously dependent upon Swedish sources and would jeopardize the substantial investments—both public and private—made during the war to achieve sufficient domestic production.

BIG LINK: This 10½-ton forged steel link will be a part of a huge down and up shear exerting 3 million pounds of knife pressure in cutting aluminum sections. Forged by Heppenstall Co., Pittsburgh, the link shown is 17½ feet high, 5 feet across at the widest portion

## Mines Yield Record Output

### Value of 1948 tonnage increases 26 per cent above former record to $15.6 billion

MINERAL production rose to an all-time peak value of $15.6 billion in 1948, an increase of 26 per cent over the former record of $12.4 billion in 1947, Secretary of the Interior J. A. Krug reports.

The prodigious dollar volume resulted not only from higher commodity prices but also from tonnage output surpassing any previous effort in peace or war. Tonnage mined in 1948 exceeded that of 1947 by 4 per cent, preliminary estimates show.

**Impressive Gain**—Fuels made the most impressive gain of any mineral group, the value rising 30 per cent above the 1947 total. Other nonmetallic minerals increased 7 per cent; metals, 27 per cent. On a physical volume basis, the tonnage of mineral fuels produced in 1948 advanced 4.8 per cent; other nonmetallic minerals, 4.7 per cent; metals, 2.9 per cent.

Steel and aluminum industries in 1948 were at levels surpassing 1947, but outputs of the major nonferrous metals were somewhat lower. Large gains quantitatively were achieved for bauxite and molybdenum in 1948,

though both were produced at rates a third below those of 1944. The sharpest decline was in mercury, whose annual rate of output in December was less than in any year during a century of record-keeping.

**More Steel Produced**—The steel industry made 88.5 million net tons of ingots and castings, a 3.5 per cent gain over the previous year, according to the preliminary report, and the third largest in history.

Mine shipments of manganese ore dipped 4 per cent in 1948; those of chromite more than tripled while those of tungsten and molybdenum increased 29 and 22 per cent, respectively. Shipments of ferroalloys from furnaces are estimated to have surpassed the 1947 total by 9 per cent in tonnage and 36 per cent in value. Ferromanganese production established a record high in 1948. Late in the year, output of ferromanganese was initiated in Montana.

Production of copper, zinc and lead in 1948 was 1, 4 and 6 per cent, respectively, below the 1947 tonnages, but prices were raised enough to effect increases of 3, 22 and 18 per cent, respectively, in value of output. Production was hampered during the year by labor-management problems.

**Bauxite Imported** — The United States was obliged to import nearly two-thirds of its bauxite needs in 1948, but the achievement of a peacetime record aluminum production was made possible partly by a peacetime record output of domestic bauxite.

Production of magnesium metal was held at a low level, awaiting wider consumer acquaintance with its advantageous properties and absorption of heavy stocks of scrap.

Mercury production was 40 per cent lower than in 1947 and the smallest since 1933.

Mining of the platinum-group metals in Alaska, the principal domestic source, in 1948 continued at about the same rate as in 1947, but nearly all requirements must be imported.

Production of crude petroleum gained 8 per cent in 1948 over 1947 and exceeded 2 billion barrels for the first time. Marketed production of natural gas increased 10 per cent to 4870 billion cubic feet. Production of all light products of the natural gasoline industry gained 9 per cent over 1947 to 6020 million gallons, of which 2110 million gallons were liquefied petroleum gases.

**Soft Coal Off**—Production of bituminous coal and lignite in 1948 was estimated at 596 million net tons, a decrease of 5 per cent from the record of 631 million tons in 1947.

Production of beehive and oven foundry coke in 1948 reached an all-time high of 74,100,000 net tons, a slight increase over the previous record of 74,038,000 tons attained in 1944.

## Youngstown Saves Manganese

YOUNGSTOWN steel plants are preparing their slag piles as emergency manganese supplies.

They have begun segregating their slag piles, keeping open-hearth and blast furnace slags and construction waste separate. They are able to recover some manganese from the open-hearth slag, although at considerable expense. Some Youngstown plants have also resumed charging open-hearth slag into their blast furnaces. Purpose of this is to recover manganese, as well as other metallics, and to get some fluxing in the blast furnaces from limestone in the slag.

## Open Philadelphia Plant to Public

NEW, greatly expanded plant for Yale & Towne Mfg. Co.'s Philadelphia Division was officially opened last week. Total cost exceeded $15 million for the plant and equipment.

Designed around its materials handling system, the plant takes over production of industrial power and lift trucks, hoists and scales formerly manufactured at the company's Tacony St. plant in Philadelphia. The 17-acre, one-story structure was completed, machine-tooled and manned by its 2200 personnel just two and a half years after the property was acquired. Facility is designed to produce 20 per cent more than the old unit.

Simultaneously with the plant's opening, the company announced production of its new Lift King line of gasoline and electric-powered trucks.

## Contract Let to Cooper-Bessemer

COOPER-Bessemer Corp., Mt. Vernon, O., has been awarded a contract calling for construction of 21 new-type Turboflow gas engine driven compressors, the largest of their type in the world, for Transcontinental Pipe Line Corp.'s proposed 30-in. pipe line, which is to be built by Fish Constructors Inc., Houston, Tex.

The contract represents authorization to build 70 per cent of the gas engine driven equipment required for Transcontinental's 1949 construction program. The 10-cylinder units scheduled for this project are rated at 2400 brake hp each.

## Yarnall-Waring Marks 40th Year

YARNALL—Waring Co. is marking its 40th anniversary with the completion of an expansion program at its Chestnut Hill, Philadelphia plant.

Chief structural changes include the the addition of two factory wings, one for a new receiving and stores department, the other for manufacturing and shipping of steam plant equipment which the company first began producing in 1908. In that year D. Robert Yarnall, an engineer, and Bernard G. Waring, a salesman, began manufacturing pipe-joint clamps. Soon seatless blow-off valves were added to the product line. In 1911 the firm bought American rights to manufacture the British Lea V-Notch meter which started the company in the field of steam gages and measurement devices.

# Calendar of Meetings . . .

**Jan. 17-18, Institute of Scrap Iron & Steel:** Convention, Netherland-Plaza Hotel, Cincinnati. Institute executive vice president is Edwin C. Barringer, Dupont Circle Bldg., Washington.

**Jan. 17-19, Truck-Trailer Manufacturers Association Inc.:** Annual convention, Edgewater Gulf Hotel, Edgewater Park, Miss. Association headquarters are at 809 National Press Bldg., Washington.

**Jan. 20-21, American Management Association:** Annual meeting of the association's finance division, at Hotel Statler, New York, formerly the Hotel Pennsylvania.

**Jan. 20-22, Society for the Advancement of Management:** Conference on industrial mobilization, Chicago. Society headquarters are at 82 W. Washington Blvd., Chicago.

**Jan. 20-22, American Mining Congress:** Regional meeting, Denver. Contact office is at 204 State Office Bldg., Denver.

**Jan. 24-25, Industrial Furnace Manufacturers Association:** Meeting in Cleveland. Association headquarters are at 420 Lexington Ave., New York.

**Jan. 24-28, American Society of Heating & Ventilating Engineers:** Ninth international heating, ventilating and air conditioning show. International Amphitheatre, Chicago.

**Jan. 27, Stoker Manufacturers Association:** General meeting, LaSalle Hotel, Chicago. Association headquarters are located at 307 N. Michigan Ave., Chicago.

**Jan. 31-Feb. 4, American Institute of Electrical Engineers:** Winter general meeting, Hotel Statler, New York. Institute headquarters are at 33 W. 39th St., New York.

**Feb. 3-4, Electric Maintenance Engineers of Milwaukee:** Tenth annual industrial electrical equipment exposition, Public Service Bldg., Milwaukee.

**Feb. 7-8, National Association of Purchasing Agents:** Mid-winter conference on public utility buying, Edgewater Beach Hotel, Chicago. Association headquarters are at 11 Park Place, New York.

**Feb. 7-9, American Road Builders' Association:** 46th annual meeting at Hotels Mayflower, Statler and Willard, Washington. Association headquarters are in the International Bldg., Washington.

**Feb. 7-11, Automotive Accessories Manufacturers of America:** Convention in Philadelphia. Association headquarters are at 501 Hardt Bldg., Philadelphia.

**Feb. 13-17, American Institute of Mining & Metallurgical Engineers:** General meeting, San Francisco.

**Feb. 14-15, Edison Electric Institute:** Convention at St. Louis. Institute headquarters are at 420 Lexington Ave.

**Feb. 21-22, Purdue University and Material Handling Institute:** Materials handling conference on Purdue campus, Lafayette, Ind.

# HYATT'S Fifty-Seventh "Thank You" Note

AGAIN for the fifty-seventh year, all the folks at Hyatt say sincerely — "We thank you."

Here at Hyatt it is not our custom to think only of our customers at greeting time.

That "the customer is boss" is constantly kept before our four thousand workers every working day.

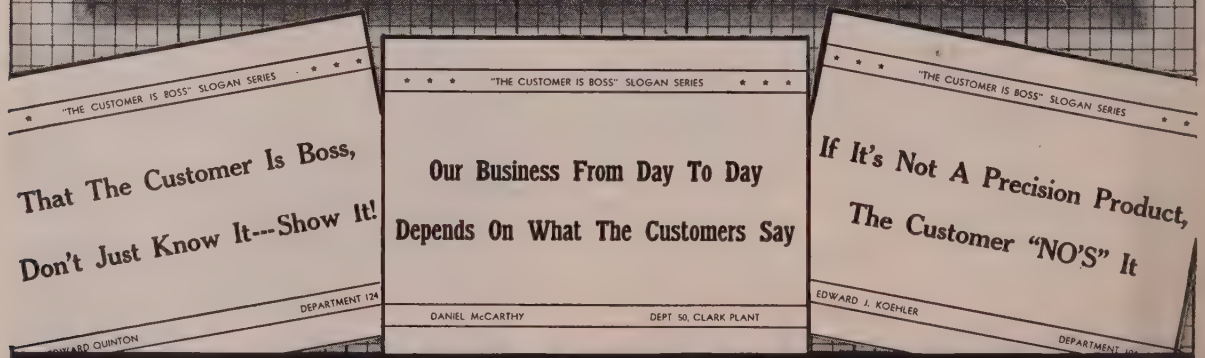
Witness the slogans, some of which are reproduced here, contributed by Hyatt employees.

With this spirit prevailing, it is natural that every Hyatt man and woman is imbued with a desire to make Hyatt Roller Bearings precisely accurate, dependable and long-lasting.

Hyatt has a long and unequalled experience as specialists in roller bearings. Our design engineers, laboratory technicians, backed by modern machines, manned by skilled operators, show the way in serving old and new Hyatt friends.

You just can't stay in business as long as Hyatt has without always looking ahead and giving workers the highest quality materials and the most modern equipment with which to produce the finest grade of roller bearings.

Our objective for 1949, as always, is your complete satisfaction with Hyatt bearings and service. Hyatt Bearings Division, General Motors Corporation, Harrison, New Jersey; Chicago; Detroit; Pittsburgh; and Oakland, California.


"THE CUSTOMER IS BOSS" SLOGAN SERIES
That The Customer Is Boss,
Don't Just Know It---Show It!
DEPARTMENT 124
"THE CUSTOMER IS BOSS" SLOGAN SERIES
Our Business From Day To Day
Depends On What The Customers Say
DANIEL McCARTHY
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"THE CUSTOMER IS BOSS" SLOGAN SERIES
If It's Not A Precision Product,
The Customer "NO'S" It
EDWARD J. KOEHLER

HYATT ROLLER BEARINGS

By A. H. ALLEN Detroit Editor, STEEL

# Mirrors of Motordom

**Kaiser-Frazer production cutback first in auto industry attributed to lagging sales. Assemblies being trimmed from 675 to 400 units daily. Credit restrictions blamed**

*DETROIT*

FIRST production cutback in the automobile industry resulting from lagging sales in the field—at least the only one to be formally identified as such—has developed at Kaiser-Frazer where daily assemblies of 675 are being trimmed to about 400. Announced a week ago, the reduction has been expected for several weeks by suppliers who had received the slow sign on releases. As of this writing it was not known for sure whether K-F would retain its full plant force of 14,000 and reduce the work week to three days or lay off about one-third of the personnel and continue the rest on a full five days.

Blame for the situation was placed by Messrs. Kaiser and Frazer squarely on the restrictive credit terms of the Federal Reserve Board's regulation which requires down payment of one-third and the balance to be paid off in no more than 18 monthly installments. The two officials decried vehemently against the regulation at a press conference Jan. 9, on the occasion of kickoff ceremonies for the big "circus week" the company staged for its 4670 dealers and distributors. They stated two of the largest finance companies in the country had reported to them the credit regulation was affecting the sale of all automobiles in the medium-price class, although as yet there have been no serious complaints voiced by other manufacturers.

**Want Extended Time Payments**—What Kaiser-Frazer wants is to extend time payments to 24 or even 30 months and the protest whirlwind has been started in the direction of the Federal Reserve Board which thus far has been cool to any changes in credit regulations. Considering the political influence which Mr. Kaiser long has demonstrated in Washington circles, it would not be surprising to see some early action by the Reserve Board. Whether this would solve the K-F problem remains to be demonstrated. Field stocks currently amount to about 21,000 cars, or roughly 3000 more than at the same time a year ago when a similar situation was confronted and solved. It is a difficult matter to load up dealers with many more cars, for one reason because finance companies are carrying a lot of this wholesale paper and are disinclined to see it become too high. Hence a close watch is being kept on sales for the next few weeks to determine whether even further assembly slashes will be necessary.

## Automobile Production

**Passenger Cars and Trucks—U. S. and Canada**

| | 1948 | 1947 |
|---|---|---|
| January | 422,236 | 366,207 |
| February | 399,471 | 393,636 |
| March | 519,154 | 443,588 |
| April | 462,323 | 445,138 |
| May | 359,996 | 404,190 |
| June | 454,401 | 421,466 |
| July | 489,736 | 400,944 |
| August | 478,146 | 364,958 |
| September | 437,181 | 444,500 |
| October | 516,843 | 461,536 |
| November | 495,918 | 417,492 |
| December | 500,000* | 492,819 |
| 12 mos. | 5,535,405* | 5,056,474 |

* Preliminary.

**Estimate for week ended:**

| | 1949 | (same week) 1948 |
|---|---|---|
| Jan. 1 | 81,968 | 65,573 |
| Jan. 8 | 97,862 | 111,276 |
| Jan. 15 | 105,000 | 109,031 |

*Estimated by Ward's Automotive Reports*

**Financial Condition Improved**—Edgar F. Kaiser, vice president and general manager, has stated that if need be schedules could be cut to 200 per day and operations continued, or in an emergency the plant could suspend completely for a short time, because its financial position has been considerably improved over a year ago. Recent negotiation of a $20 million chattel mortgage has helped in this respect.

The cold hard facts of the case, in the opinion of many, is that K-F has been and still is a high-cost operations, because it had to start practically from scratch and was faced with tremendous and expensive problems in regard to procurement of materials and parts. As long as demand was unlimited for any and all passenger cars which could be built, price was of little concern. But when the buying public starts to become choosy, the high-cost producer runs into trouble. It is true that K-F dealers have softened the relatively high price of their models by allowing more on trade-ins than the competition. There is a limit, however, to how far this practice can be carried, and the ultimate solution may have to be a price cut by the manufacturer.

Continuing shortages of critical materials are responsible for the recent 10 per cent reduction in output of Ford's Lincoln-Mercury Division, according to Benson Ford, vice president. Despite the cutback, Ford believes this year's Lincoln-Mercury production will equal or surpass that of 1948.

## Ford To Train Managers

NEW approach to management development, training and promotion has been instituted by the policy committee of the Ford Motor Co., after two years of study and preparation. It has the twofold purpose of training all present members of management in the specific duties of being a manager, and selecting qualified employees for promotion as trainee members of management and training them to meet management responsibilities and handle their job assignments with a maximum of effectiveness.

Co-ordinating the program will be a special committee comprising: John Dykstra, general manager of Machining & Forging Division; Alton J. Hole, general manager of Highland Park operations; Richard E. Krafve, assistant to the vice president-manufacturing; Logan C. Miller, general manager, Rouge automotive manufacturing operations; Dan L. Newkirk, manager, blast furnaces and coke ovens; Stanley W. Ostrander, manager-operations, Lincoln-Mercury Division; James K. Sutherland, manager, steel operations; and Max L. Wiesmyer, general manager, Ford assembly operations. Mr. Krafve is chairman. The committee will co-ordinate the management development program with the training department of industrial relations and other staff and line departments, will establish prior-

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NEW CHEVROLET SUSPENSION: Key men directing the 1949 Chevrolet inspect the new front suspension which is one of the major engineering developments in the new model. Shown, left to right: John G. Wood, chief engineer; T. H. Keating, general sales manager; Hugh Dean, manufacturing manager; W. F. Armstrong, general manager; E. W. Ivey, chief administrative assistant

ities for training programs, will review and approve training materials and will keep tab on results of the overall program.

**Seeks to Provide "Know-How"**—On the management development side, the aim is to provide each member of supervision with the "know-how" needed for effective performance of the following responsibilities: Personnel, quality, cost, production, staff services, company development and tools, machines equipment and materials. Essentially three factors make for effective "know-how," as Ford sees it—understanding of what to do, understanding of how to do it, and the practical experience which develops the ability to do it well. An interesting angle is that all instruction on how to improve the job performance of supervisors in their present positions will be given on company time.

Detailed procedures have been worked out for hourly rated employees to qualify for promotion to foremen. A selection committee will screen lists of applicants and will then establish an eligibility list of approved candidates for placement in filling requests for trainee foremen. Progress of trainees will be evaluated by general foremen and superintendents.

**Provides Opportunities**—Boiled to its essence the management development program provides these opportunities:

1. It is representative of the whole future policy of Ford with respect to the selection of supervision.

2. It is the only way in which anyone can become a foreman or a supervisor in the future.

3. It is from the ranks of supervisors that the future executives of the company will be selected.

4. It is designed to be of value to every member of management and training will be in the specific duties of management.

5. It will assist the foreman or supervisor who is laid off due to a reduction in force in that he will be considered for any vacancy in supervisory ranks before any new supervisor is selected for such vacancy.

6. It means that every man's progress in management development will depend upon his own ability and initiative—upon what he knows and not whom he knows.

**Departure for Ford**—The program has been summarized at length because it is a radical departure in the annals of the Ford Motor Co. Perhaps a little idealistic in concept, nevertheless the honest effort of a large organization to provide the means for the "little fellow" to move up through the ranks on the strength of his in-born initiative and ability is worthy of noting. One thing which is not touched on is the provision of suitable management incentives—either monetary or participating in ownership—which usually have characterized successful corporations staffed by the keenest and ablest managers. General Motors could be cited as a case in point. All the top executive talent of GM participates in bonuses, cash and stock, which in good times run to handsome proportions. If Ford is to compete on a management level with GM, and it certainly has given every indication in the past three years it intends to do so, will not some means have to be found to hold and keep satisfied the requisite able management? Looking to the years ahead, this might easily lead to a disposition of ownership of the company on the part of the Ford family, and a reconstitution of the company on a conventional—or even unconventional — corporate basis to permit the management group a more active participation in earnings.

## Million Hydra-matics

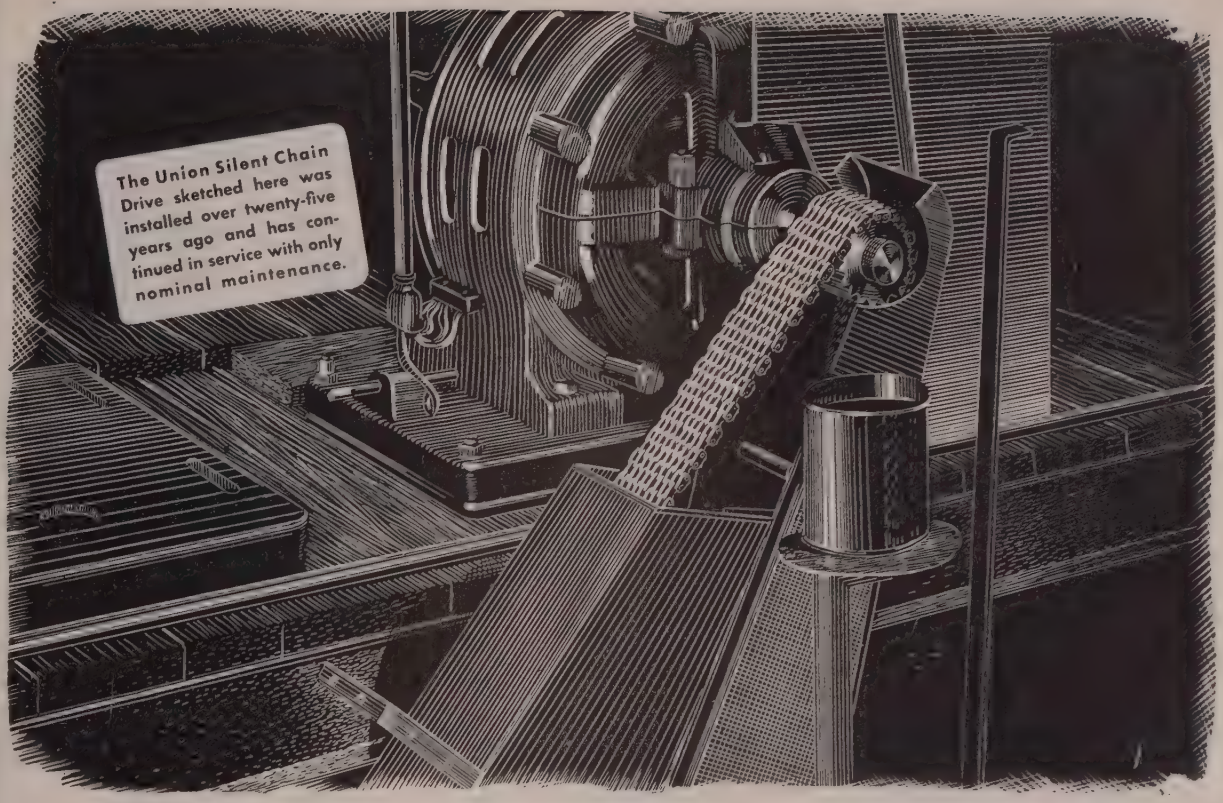
WHETHER or not the "torque converter is going to be it" in the automatic transmission field—a question discussed at length by a General Motors engineer before the SAE meeting here last week—the Detroit Transmission Division of GM has announced that as of Jan. 7 it had built an even 1,000,000 of the step-type hydra-matic transmissions for Cadillac, Oldsmobile and Pontiac. The record dates back to June, 1939, when DTD started manufacture of the transmission after its introduction in a somewhat different form by Oldsmobile (manufactured by Buick).

Last year alone saw 414,000 hydra-matics manufactured, or enough to equip a little more than 10 per cent of all passenger cars built during the year. Currently, about 25 per cent of all GM production is equipped with the transmission. Last year Pontiac supplied hydra-matic drive on better than 72 per cent of its total output of 253,469 cars, a surprising achievement in view of the fact it was the first year Pontiac had offered the option, and at an extra charge of $175. Three separate models of the transmission must be built for the three GM cars using it, since the device must be tailored to fit the power-weight ratio.

## Court Closes Tucker Plant

UNITED STATES District Court has ordered activity at Tucker Corp.'s Chicago plant confined to a "shutdown maintenance" basis indefinitely.

In addition to limiting plant activity of the automobile firm, the order restrains Preston Tucker, corporation president, from selling any company assets or drawing a salary or expenses. The company is now involved in two bankruptcy suits and a receivership action.


The Union Silent Chain Drive sketched here was installed over twenty-five years ago and has continued in service with only nominal maintenance.

# What's Interesting About UNION CHAIN'S Performance?

**Union Chains for Every Application**

**Drive and Conveying Chains and Sprockets**
- Bridge Chain
- Combination Malleable Iron and Steel Chain
- HB (hardened bearing) type chain
- BP (bar and pin) type chain

★

**Finished Steel Roller Chains and Sprockets**
- All manufacturer's standard, size ⅜ in. to 2½ in. pitch
- Single and Multiple Strands
- Extended Pitch Series in sizes 1¼ in. to 4 in. pitch

★

**Silent Chain and Sprockets**
- All sizes ⅜ in. to 1½ in. pitch

★

**Flexible Couplings**
- Roller chain type
- Silent chain type

Just this. Most chain users who have given UNION Chain a fair trial have become regular UNION customers. Perhaps this is the reason:

The Union Chain Plant, Management, Personnel, Engineering, Raw Material, Supervision, Manufacture, Selling and Shipping are solely devoted to but one consideration—better chain. UNION manufactures a complete line of steel sprocket chains and attachments for power transmission and materials handling—**nothing else.** This specialization all along the line results in an end product performance which makes its own friends.

**The Union Chain and Manufacturing Company**

TRANSMIT POWER
UNION CHAINS
CONVEY MATERIALS

**Sandusky, Ohio, U.S.A.**

## Youngstown Expands

**Sheet & Tube to spend $16 million on plant betterment, compared with $8,750,000 in 1948**

YOUNGSTOWN Sheet & Tube Co. will spend $16 million on additions and improvements to its plants this year, compared with $8,750,000 spent in 1948.

Major improvements this year will be in Chicago district plants although extensive work is planned for the Youngstown district. Principal projects in the Chicago area include installation of a continuous butt weld tube mill and a new continuous furnace for the 10-in. skelp mill plus additional stands to increase output.

The company's major project last year was rebuilding its No. 1 blast furnace in the Chicago district. Nearly $1 million was also spent in 1948 in the iron ore country for new equipment and for developing new mining territory.

TRAVELING EXHIBIT: A mobile unit to demonstrate its fasteners and fastening techniques has been developed by Shakeproof Inc., Chicago. Sides of the trailer are lined with special testing equipment and with exhibits showing fastening applications on familiar products. Unit is equipped for sound motion picture projection for a limited audience. Unit will be made available for use by manufacturers, educational institutions and professional groups

## Sheffield Buys Texas Furnace

WAR Assets Administration has sold a blast furnace and by-product coke oven at Houston, Tex., together with the North and South Basin iron ore beds and beneficiating equipment at Linden and Jacksonville, Tex., to Sheffield Steel Corp. for $7,150,000.

The properties have been leased to Sheffield, the wartime operator, since April, 1947. Sheffield plans to construct two open-hearth furnaces in the immediate vicinity, as well as finishing facilities which will boost the company's output one-third by 1950. Supplementary to the transaction was the acquisition by Sheffield of coal lands in Oklahoma, under jurisdiction of the Interior Department, for $181,000. Sheffield also operates a steel blooming mill at Houston, which it had under a 20-year lease from WAA, as well as open-hearth facilities which it bought from WAA in September, 1946.

## Sharon Plans $4 Million Growth

SHARON Steel Corp., Sharon, Pa., plans to spend $4 million on its improvement program this year, according to Henry A. Roemer, chairman and president.

This will increase expenditures in its current improvement program to $25 million. The projects include a new tube mill at the Farrell works, finishing up a new 14-in. strip mill which will be completed in February, other improvements at its blast furnaces and steel plant at Farrell and considerable work at its new coal mining property in West Virginia.

## East Chicago Foundry For Sale

STEEL foundry in East Chicago, Ind., adaptable for many types of heavy industry, including the production of steel ingots, is being offered for sale by War Assets Administration.

The plant, at Railroad Ave. and 145th St., was operated during the war by Continental Foundry & Machine Co. for the production of heavy steel castings. Earlier bids on this facility have been rejected and negotiations pending last fall (STEEL, Sept. 6, 1948, p. 63) have not effected a sale. The foundry is equipped with three 40-ton open hearth furnaces and accessory equipment. Bids for the property will be accepted at WAA, Navy Pier, Chicago, until 2 p.m., Jan. 21.

## Strip Splicing Machine Developed

ARMS-FRANKLIN Corp., Youngstown, has developed a new type strip splicing machine, for which it expects a large market from the metalworking industry.

The new machine was designed by Lyle V. Anderson, chief engineer for Arms-Franklin, which engineers and builds rolling mill machinery. He explains that the device is both a shearing and a welding unit, shearing ends of coils and welding end of coils to new coils at high speed. The unit is designed for use in cold rolling units, continuous annealing operations and other processes where it is desirable to splice coils of strip without stopping the operation.

## Bethlehem Furnace Sets Record

WORLD'S record for pig iron production was made by blast furnace "H" at Bethlehem Steel Co.'s Sparrows Point, Md., plant. The furnace, designed by Arthur G. McKee & Co., Cleveland, produced 54,336 tons in December, which is more than has been produced in one month by any blast furnace in prior history.

This record was made under normal operating conditions, using ore only and no scrap. The furnace, which has a 28-foot hearth, was first lighted Apr. 24, 1948. The prior record was made by the same furnace in October with 51,231 tons.

Bethlehem Steel as a whole broke its own production records in 1948 in coke, pig iron and steel. The new marks were: Coke, 7,984,899 tons; pig iron, 8,553,313 tons; and steel, 13,410,553 tons of ingots. The company's former records, all made in 1944, were: Coke, 7,936,478 tons; pig iron, 8,385,231 tons; and steel 13,262,348 tons of ingots.

# Briefs . . . .

## Paragraph mentions of developments of interest and significance within the metalworking industry

**Vensom Co.,** Birmingham, has been recently formed to manufacture premix cup machines at 520 N. 21st St. Norman K. Ransom is president.

—o—

**Union Pacific Railroad,** Omaha, Nebr., reports its freight traffic department has issued a 62-page booklet on increased rates and charges. A free copy may be obtained by writing the freight traffic department, Fifteenth and Dodge Sts.

—o—

**H. K. Ferguson Co.,** Cleveland, industrial engineering and building firm, has opened a Western district office at 712 Curson St., Los Angeles. Henry Maag will be in charge.

—o—

**General Tire & Rubber Co.,** Akron, has purchased a tire manufacturing facility at Waco, Tex., from War Assets Administration for $240,000. The facility is intermingled with the privately-owned plant of General's Waco Division and cannot be operated independently.

—o—

**Milwaukee Chaplet & Mfg. Co.,** Milwaukee, is completing a warehouse on S. 44th St., that city.

—o—

**Pennsylvania Salt Mfg. Co.,** Philadelphia, has organized Pennsalt International Corp. as a subsidiary to take over foreign interests of the parent company. The new firm will import and export chemicals and raw materials.

—o—

**Crucible Steel Co. of America** has sold its Park Works, Pittsburgh, on which negotiations have been pending, to Deere & Co., Chicago. Crucible will operate the furnaces for Deere. Facilities include four 50-ton basic open-hearth furnaces and two 10-ton electric arc furnaces.

—o—

**Monsanto Chemical Co.,** St. Louis, announces its English subsidiary, Monsanto Chemicals Ltd., has purchased control of Silicon (Organic) Developments Ltd., Bridgend, Glamorgan, England. The newly acquired company specializes in the field of developing silicate esters, some of which are important in precision casting of turbine blades for jet power units.

—o—

**Universal-Rundle Corp.** will be the new name for Universal Sanitary Mfg. Co., New Castle, Pa., and Rundle Mfg. Co., Milwaukee, which merge Feb. 1. The new company, with headquarters in New Castle, will produce a full line of bathroom equipment, kitchen sinks and related items. Firm will have plants in New Castle, Milwaukee, Redlands, Calif., and Camden, N. J.

—o—

**Socony-Vacuum Oil Co. Inc.,** New York, has almost completed a storage-tank construction program in 25 cities of northeastern United States. Additional tanks have a total capacity of more than 61 million gallons for home-heating fuel and other petroleum products.

—o—

**Raybestos-Manhattan Inc.,** Passaic, N. J., has opened a warehouse and office at 314 Occidental Ave., Seattle, which will stock industrial rubber products. Russell G. Heuman is in charge.

—o—

**Federation for Railway Progress** has moved its headquarters from Cleveland to 1430 K St., Washington.

—o—

**Cecil F. Elmes Organization,** consulting engineering firm specializing in public utility valuations and related matters, has moved its headquarters, formerly in New York and Chicago, to Whitfield Estates, Sarasota, Fla.

—o—

**Westinghouse Electric Corp.,** Pittsburgh, has received a $500,000 order from the U. S. Coast Guard for 60 radar sets.

—o—

**Hickman-Williams & Co.,** Chicago, as of Jan. 1, formally terminated its contract with Electro Metallurgical Sales Corp., division of Union Carbide & Carbon Corp., New York, for sale of ferroalloys.

—o—

**E. I. du Pont de Nemours & Co.,** Wilmington, Del., is instituting a program of grants-in-aid to ten universities for the 1949-50 academic year for unrestricted use in fundamental chemical research. The universities to which grant-in-aid of $10,000 each is being offered are California Institute of Technology, Cornell University, Harvard University, Massachusetts Institute of Technology, Ohio State University, Princeton University, Yale University, University of Illinois, University of Minnesota and University of Wisconsin.

—o—

**American Washer & Ironer Manufacturers Association,** Chicago, reports that factory sales of standard-size household washers in November were 12 per cent below November, 1947, and 16 per cent below October sales. Sales for the first 11 months of 1948 were 20 per cent ahead, however, of the same 1947 period.

—o—

**National Pressure Cooker Co.,** Eau Claire, Wis., is closing its pressure cooker plant at Menomonie, Wis., which will be offered for sale or lease. Unit was closed for lack of business.

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**Pannier Corp.,** Pittsburgh, producer of dies, stamps and stencils, is this year celebrating its 50th anniversary.

—o—

**War Assets Administration** is offering a 100-mile natural gas transmission line in Louisiana for sale. The line starts near Lake Charles, La., and extends to Woodlawn, North Tepetate, Lakeside and Chalkley, La. It is now being operated by Union Sulphur Co.

—o—

**Rheem Mfg. Co.,** San Francisco, reports that its tenth affiliated plant abroad is nearing completion at Buenos Aires, Argentina, and is scheduled to be in production of steel shipping containers by March. The plant will also eventually manufacture pails and tanks.

—o—

**Stanford University,** Stanford, Calif., has established a division of engineering mechanics in its School of Engineering. The division will administer a graduate program and grant masters and doctoral degrees, and will also co-ordinate sponsored research in its field.

—o—

**Acme Steel Co.** reports that Acme Steel Co. of Canada Ltd. has moved its general offices and Montreal branch to larger quarters at 660 St. Catherine St. West.

—o—

**Vendorlator Mfg. Co. Inc.,** Fresno, Calif., maker of coin-operated beverage coolers, has established a plant at Piqua, O., to serve as its manufacturing center in the East.

—o—

**Timken-Detroit Axle Co.,** Detroit, reports that limited production of heavy-duty trailer axles will begin at its new Kenton, O., plant by Feb. 1. Full production will be reached sometime in the fall of 1949.

—o—

**Illinois Manufacturers' Association,** Chicago, has published its 1949 tax calendar which lists the days when federal, state or local tax returns, tax payments or reports will come due.

—o—

**Kaiser Co. Inc.** has awarded a contract for the fabrication and erection of a new blast furnace at Fontana, Calif., to Consolidated Western Steel Corp., a U. S. Steel Corp. subsidiary.

# The Business Trend

RECOVERING from the holiday slump, STEEL's industrial production index for the week ended Jan. 8 registered 167 per cent (preliminary) of the 1936-1939 average, 11 points higher than the revised total for the preceding week. Despite this rise, the index for the latest week was 1 point below the level for the corresponding week a year ago and marked the first time in four months that the index for the latest reporting period was below the year ago total.

**AUTOMOBILES**—Lower outturn by the automobile builders resulting from model changeovers and inventory taking was a major reason for the failure of industrial output to climb higher above holiday levels. Production for the week ended Jan. 8 was 97,862 units, considerably lower than the 111,276 passenger cars and trucks completed in the corresponding week last year. Additional model switching and the lessened production which follows are expected to hold down the automotive industry's volume for January to a total of about 480,000 units. December production was 501,307 passenger cars and trucks.

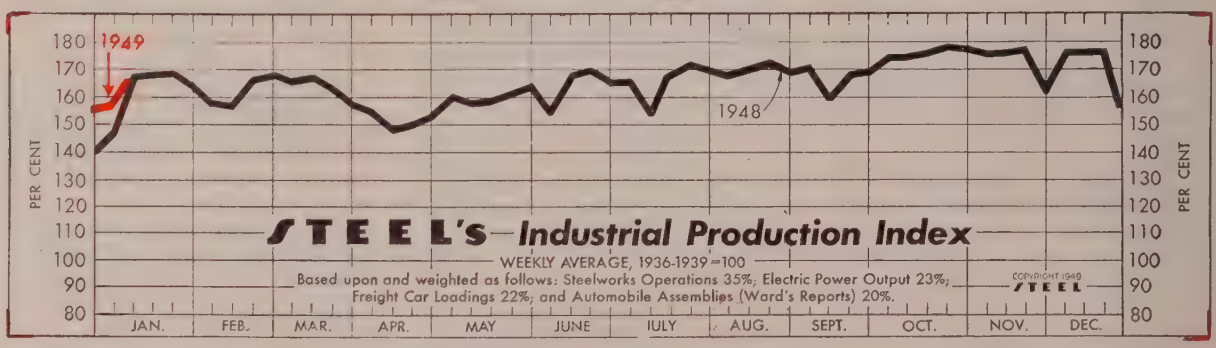
**STEEL**—Production of steel for ingots and castings was at 97.5 per cent of capacity in the week ended Jan. 8. The operating rate, however, is based on 1949 capacity figures released last week by the American Iron & Steel Institute. Weekly capacity for 1949 is 1,843,516 net tons as compared with the 1948 weekly capacity of 1,802,476 tons.

**INVENTORIES**—Total business inventories at the end of November were valued at $55.3 billion, an increase of about $800 million over the October level. According to the Commerce Department, about 60 per cent of this increase was seasonally normal for the period of the year. Manufacturers' and retailers' inventories each rose over $300 million and wholesalers' stocks were up about $150 million.

**PRICES**—Average primary market prices declined 0.6 per cent during the week ended Jan. 4 and the Bureau of Labor Statistics' index is now 161.3 per cent of the 1926 average. This is 0.7 per cent lower than four weeks ago and 2.5 per cent below the comparable week in 1948.

**INCOME**—Personal income in November was at an annual rate of $216.7 billion in November, an increase of $1 billion from October. The Commerce Department reports about half of the monthly rise occurred in agricultural income, with increases in dividends and interest and in government payrolls accounting for the remainder of the rise.

**RAILROADS**—Domestic freight car deliveries during December totaled 9967, third largest monthly production figure of the year, according to the American Railway Car Institute. Totaling 112,634 cars, deliveries in 1948 were the highest since 1924 and well above the 68,552 cars delivered in 1947. Of December deliveries, 7364 were from the car builders and 2603 were built in railroad shops. Production of the leading types in 1948 was: Box, 40,201; gondolas, 13,587; hoppers, 41,113; refrigerator, 8049; tank, 6831.




**Index (chart above): Week ended Jan. 8 (preliminary) 167 Previous Week 156 Month Ago 171 Year Ago 168**

## BAROMETERS of BUSINESS

| INDUSTRY | Latest Period* | Prior Week | Month Ago | Year Ago |
|---|---|---|---|---|
| Steel Ingot Output (per cent of capacity)† | 97.5 | 97.5 | 100.0 | 97.0 |
| Electric Power Distributed (million kilowatt hours) | 5,692 | 5,562 | 5,705 | 5,278 |
| Bituminous Coal Production (daily av.—1000 tons) | 1,445 | 1,589 | 1,892 | 1,912 |
| Petroleum Production (daily av.—1000 bbl) | 5,454 | 5,611 | 5,620 | 5,313 |
| Construction Volume (ENR—Unit $1,000,000) | $124.5 | $78.1 | $83.7 | $85.7 |
| Automobile and Truck Output (Ward's—number units) | 97,862 | 81,968 | 124,041 | 111,276 |

* Dates on request. † 1949 weekly capacity is 1,843,516 net tons. 1948 weekly capacity was 1,802,476 net tons.

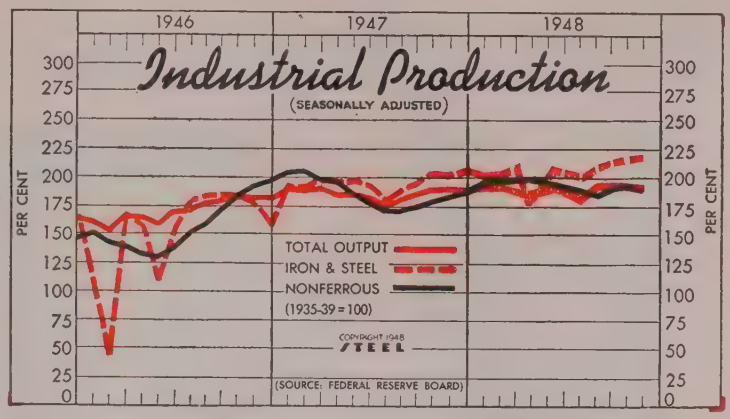
| TRADE | | | | |
|---|---|---|---|---|
| Freight Carloadings (unit—1000 cars) | 750† | 585 | 783 | 831 |
| Business Failures (Dun & Bradstreet, number) | 128 | 128 | 122 | 87 |
| Money in Circulation (in millions of dollars)‡ | $28,151 | $28,324 | $28,415 | $28,658 |
| Department Store Sales (changes from like wk. a yr. ago)‡ | none | +32% | −5% | +9% |

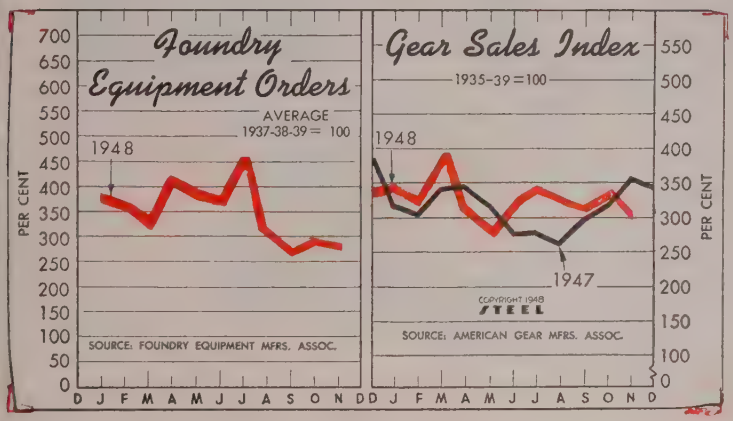
† Preliminary. ‡ Federal Reserve Board.

## Federal Reserve Board's Production Indexes

(1935-39 = 100)

| | Total Production | | Iron, Steel | | Nonferrous | |
|---|---|---|---|---|---|---|
| | 1948 | 1947 | 1948 | 1947 | 1948 | 1947 |
| Jan. | 193 | 189 | 203 | 192 | 197 | 203 |
| Feb. | 194 | 189 | 203 | 191 | 197 | 208 |
| Mar. | 192 | 190 | 207 | 196 | 200 | 202 |
| Apr. | 188 | 187 | 177 | 195 | 198 | 197 |
| May | 191 | 185 | 206 | 197 | 197 | 187 |
| June | 192 | 184 | 207 | 193 | 193 | 179 |
| July | 186 | 176 | 200 | 181 | 185 | 171 |
| Aug. | 191 | 182 | 207 | 188 | 186 | 170 |
| Sept. | 191 | 186 | 214 | 190 | 191 | 174 |
| Oct. | 195 | 190 | 221 | 205 | 192 | 179 |
| Nov. | 194 | 192 | 222 | 203 | 189 | 185 |
| Dec. | ... | 192 | ... | 205 | ... | 189 |
| Ave. | ... | 187 | ... | 193 | ... | 186 |




| | Foundry Equipment Orders* Index (1937-38-39=100) 1948 | Gear Sales Index (1935-39=100) 1948 | Gear Sales Index (1935-39=100) 1947 |
|---|---|---|---|
| January | 380.9 | 346.8 | 317.0 |
| February | 367.3 | 324.4 | 303.0 |
| March | 326.2 | 389.8 | 342.9 |
| April | 412.0 | 320.9 | 346.2 |
| May | 388.5 | 283.6 | 317.2 |
| June | 376.8 | 324.1 | 278.0 |
| July | 456.3 | 348.4 | 278.5 |
| August | 324.7 | 335.6 | 261.6 |
| September | 273.5 | 320.4 | 297.7 |
| October | 296.0 | 333.3 | 317.7 |
| November | 284.4 | 309.0 | 356.9 |
| December | .... | .... | 343.6 |

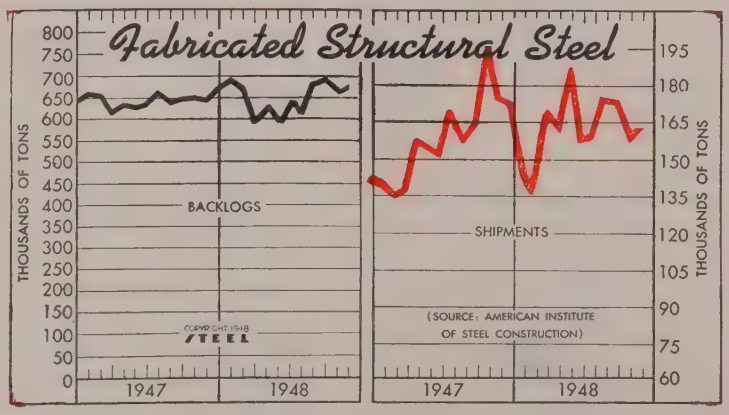
* By foundry trades only.

## Fabricated Structural Steel

(000 Tons)

| | Shipments 1948 | Shipments 1947 | Shipments 1946 | Backlogs 1948 | Backlogs 1947 | Backlogs 1946 |
|---|---|---|---|---|---|---|
| Jan. | 146.4 | 140.6 | 107.5 | 692 | 661 | 552 |
| Feb. | 141.6 | 136.1 | 63.8 | 673 | 656 | 551 |
| Mar. | 167.0 | 137.8 | 102.8 | 597 | 614 | 605 |
| Apr. | 166.7 | 157.4 | 122.5 | 630 | 632 | 674 |
| May | 186.9 | 155.0 | 124.4 | 593 | 628 | 615 |
| June | 157.1 | 151.9 | 126.8 | 647 | 634 | 642 |
| July | 160.8 | 169.9 | 140.2 | 613 | 661 | 674 |
| Aug. | 176.3 | 158.0 | 157.5 | 691 | 639 | 651 |
| Sept. | 175.0 | 164.3 | 141.9 | 698 | 648 | 682 |
| Oct. | 162.1* | 196.1 | 164.7 | 669 | 649 | 660 |
| Nov. | 164.9 | 175.0 | 157.3 | 673 | 645 | 665 |
| Dec. | .... | 173.0 | 142.1 | ... | 671 | 646 |
| Total | .... | 1,915.1 | 1,551.6 | | | |

* Revised.




## FINANCE

| | Latest Period* | Prior Week | Month Ago | Year Ago |
|---|---|---|---|---|
| Bank Clearings (Dun & Bradstreet—millions) | $15,062 | $13,682 | $15,665 | $13,038 |
| Federal Gross Debt (billions) | $252.4 | $252.3 | $252.4 | $256.5 |
| Bond Volume, NYSE (millions) | $16.1 | $16.7 | $16.6 | $28.4 |
| Stocks Sales, NYSE (thousands) | 5,339 | 7,027 | 6,281 | 5,178 |
| Loans and Investments (billions)† | $62.8 | $63.1 | $62.3 | $64.8 |
| United States Gov't. Obligations Held (millions)† | $32,987 | $33,455 | $33,075 | $37,227 |

† Member banks, Federal Reserve System.

## PRICES

| | | | | |
|---|---|---|---|---|
| STEEL'S composite finished steel price average | $97.68 | $95.50 | $95.50 | $78.05 |
| STEEL's Nonferrous Metal Composite‡ | 232.6 | 232.6 | 232.6 | 186.2 |
| All Commodities† | 161.3 | 162.2 | 162.4 | 165.5 |
| Metals and Metal Products† | 175.2 | 173.7 | 173.7 | 153.9 |

† Bureau of Labor Statistics Index, 1926=100. ‡1936-1939=100.

# Men of Industry

FRANK J. WHELAN

C. H. WILLIAMS

WALTER A. JAYME

Worthington Pump & Machinery Corp., Harrison, N. J., announces that the sale of welding positioners and turning rolls manufactured at its Dunellen Works will be supervised by **Frank J. Whelan,** vice president, with headquarters at the company's executive offices at Harrison. He also will continue to supervise the sale of standard pumps, compressors, and mechanical power transmission equipment sold through industrial and oil field distributors, as well as sales to original equipment manufacturers. **F. J. Connolly** will continue as manager, Welding Positioner & Turning Roll Sales Division, and **A. B. Kime** continues as eastern regional supervisor, both operating from Dunellen Works. **P. J. Patton Jr.** will remain at the company's Chicago district office as central regional supervisor.

—o—

**Floyd Rose,** chairman, Firth Sterling Steel & Carbide Corp., McKeesport, Pa., has retired but will continue as a member of the board of directors. **Michael N. W. de Berardinis** has been appointed manager of sales promotion and advertising for the company.

—o—

Modern Collet & Machine Co., Ecorse, Mich., announces appointment of **Joseph F. Lask** as general manager, and **John L. Bradford** as sales manager.

—o—

**H. D. Stark,** assistant to the vice president in charge of operations, Jones & Laughlin Steel Corp., Pittsburgh, and for many years general superintendent of Pittsburgh Works, has retired after 49 years of service with the corporation.

—o—

**Philip J. Linder,** former chief engineer, Hydraulic Press Mfg. Co., Mt. Gilead, O., has been placed in charge of the company's Detroit branch sales office.

—o—

**C. H. Williams,** chief engineer, Carnegie-Illinois Steel Corp., Pittsburgh, has been elected president of the Association of Iron & Steel Engineers for 1949. **John L. Young,** vice president of engineering, National Tube Co., Pittsburgh, was elected secretary of the association. Other officers are: **A. S. Glossbrenner,** assistant vice president of operations, Youngstown Sheet & Tube Co., Youngstown, who is first vice president; **J. F. Black,** general superintendent, Wickwire Spencer Steel Division, Colorado Fuel & Iron Corp., Buffalo, elected second vice president; and **I. N. Tull,** electrical superintendent, Republic Steel Corp., Cleveland, named treasurer.

—o—

**Henry W. Johnson** has retired as vice president in charge of manufacturing, De Laval Steam Turbine Co., Trenton, N. J., but will continue as director and a member of the executive committee. **C. Richard Waller** has been named vice president and director for engineering; **H. G. Bauer** was elected vice president and executive engineer; **J. P. Stewart** manager, Commercial Sales Division, has been elected a vice president; and **W. A. Reynolds** assumes responsibility for development and merchandising of new small products in addition to his position as manager, IMO Pump & Worm Gear Divisions. **W. A. Neumann Jr.** has been appointed controller.

—o—

**T. A. Engstrom,** vice president, Continental Motors Corp., Muskegon, Mich., has been named works manager of the company's Aircraft, Automotive and Industrial Engine Divisions. Other promotions in the divisions include **Ed Kring** from division superintendent to factory manager; **R. D. Johnson** from production manager to assistant factory manager; and **Robert Bird** from supervisor of schedules to production manager.

—o—

**Walter A. Jayme** has been promoted to general superintendent of the Gary, Ind., works of National Tube Co., subsidiary, U. S. Steel Corp. He has been assistant general superintendent of the plant since 1947.

—o—

**E. G. Bergren** has been appointed general manager, Taylor & Spotswood Co., San Francisco iron and steel warehouse firm. **John D. Smart** succeeds Mr. Bergren as manager of purchases and **Willian C. Tagmyer** succeeds Mr. Smart as manager, Tubular Division.

—o—

**A. Oram Fulton** has been elected chairman of the board of directors and executive officer, Wheelock, Lovejoy & Co. Inc., Cambridge, Mass., and he also continues as treasurer. **Frederick H. Lovejoy,** who has been executive vice president, was elected president to succeed Mr. Fulton.

—o—

Superior Steel & Malleable Castings Co., Benton Harbor, Mich., announces appointment of **George H. Bachman** as production manager.

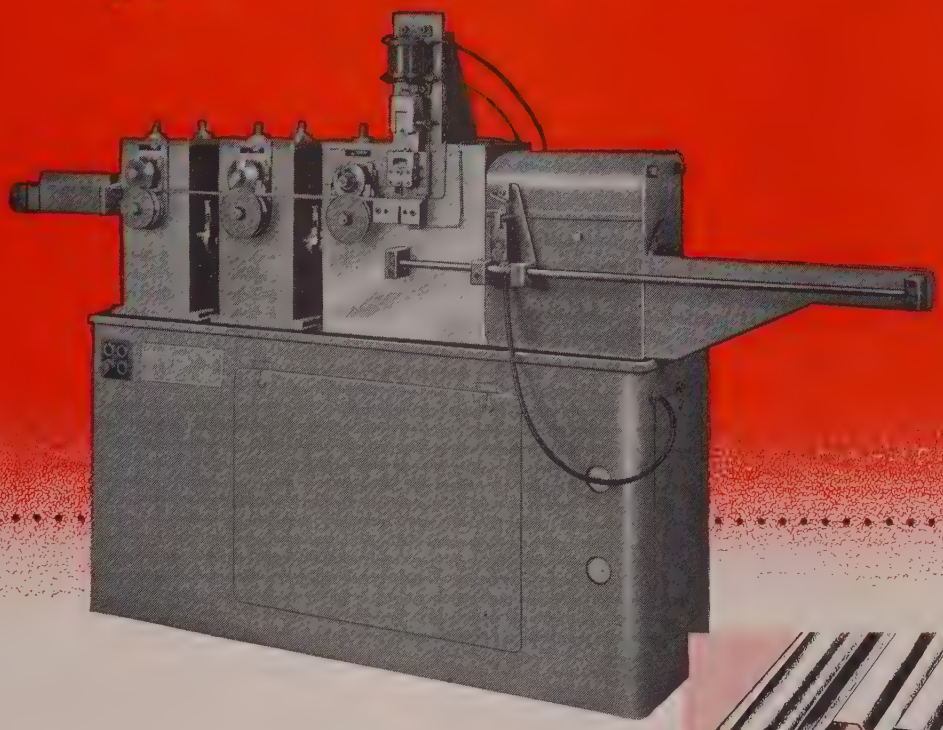
—o—

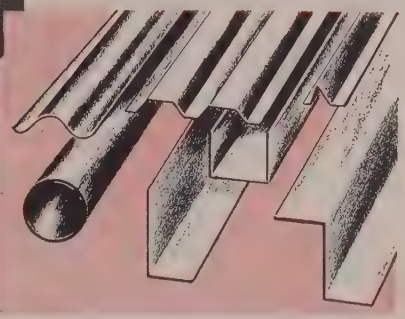
**R. R. McClure** has been appointed general superintendent, Pure Calcium Products Division plant, Diamond Alkali Co., Painesville, O.

—o—

**Edward D. Murphy** has been elected

# *For* Cold Roll Forming





Maximum 16 gauge in mild steel, brass, aluminum and some types of stainless.

Maximum 1/4" mild steel, brass, or aluminum wire.

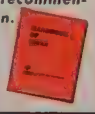
Above are capacities of CRT cold roll forming machines.

## CLEVELAND REPUBLIC

**Gives 90-120 Day Delivery . . . On Machines Similar To Above Illustration**

The illustrated machine was furnished to a large manufacturer, for cold roll forming aluminum alloy channels. Stock thickness .015, channel 5/16 x 5/16 x 5/16. The machine is roll forming channels varying from 1-1/8" long to 48" long with tolerances ±1/32". Channels are being produced at a rate up to 9000 pieces per hour. Simplicity of design enables a single operator not only to operate the machine but also, in 4 or 5 minutes, to reset machine for another length of piece. The above is a three-station machine, however, as many stations as necessary may be provided to suit the individual job.

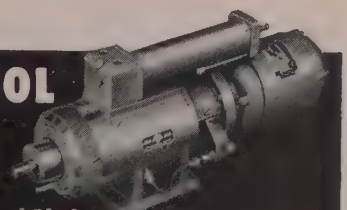
*WRITE: for further information. There is no obligation in getting the recommendations of our engineers on special machinery design and application.*



Send for our HANDBOOK of IDEAS

CRT

**CLEVELAND REPUBLIC TOOL CORPORATION**



General Sales Office, Main Plant and Foundry Division
9615 Meech Avenue, Cleveland 5, Ohio - Detroit Office, 6505 Second Blvd.

a director, National Can Corp., New York. He has been a vice president since 1941.

—o—

**George H. Hodges** has been appointed manager, marine department, Babcock & Wilcox Co., New York. **William M. Firshing** has been transferred from that department to assist **J. H. King,** vice president, in such duties as may be assigned. **George A. Mattucci** has been appointed assistant manager and **Edward L. Boland,** assistant to manager, marine department. **Calvin H. Lawrence** has been appointed the company's marine manager for the Great Lakes district.

—o—

**Edmund J. Walsh** has been appointed assistant manager of sales, Boston sales office, American Steel & Wire Co., U. S. Steel Corp. subsidiary.

—o—

**Robert E. Barnett,** specialist in atmospheric sampling and analysis, has joined Sam Tour & Co. Inc., consulting engineer, New York.

—o—

**George B. Coale** has been appointed chief engineer, National Lead Co., New York, succeeding **Andrew Mayer,** retired.

—o—

**Frank H. Reynolds** has been named vice president, Continental Equipment Corp., New York.

—o—

**George R. Gibbons,** senior vice president and director, Aluminum Co. of America, has retired as an officer of the company, but will continue as a member of the board of directors. **E. A. Jack,** general traffic manager, has retired after 29 years of service with Alcoa. He is succeeded by **Warner B. Shepherd.**

—o—

**Eugene W. Smith,** for the past 2½ years associated with Western Materials Co., Chicago, has been elected vice president.

—o—

**C. S. Macnair** has joined Acme Steel Co., Chicago, as consultant on product development. He has been operating his own package engineering business in Chicago. **Robert M. Snodell** has been named assistant advertising manager of the company.

—o—

**Norman Rendleman,** after 40 years' association with Jones & Laughlin Steel Corp., joins the staff of United Engineering & Foundry Co., Pittsburgh, as special consultant. He is a roll engineer.

—o—

**Benjamin H. Askew** has been appointed assistant to the controller, International Business Machines Corp., New York. He was IBM manager in Raleigh, N. C.

—o—

Electric Storage Battery Co., Philadelphia, announces consolidation of its railway and motive power sales activities, and appointment of **W. Van C. Brandt** as manager of this new division to be known as Railway & Motive Power Sales.

—o—

**Dr. Mary Baeyertz** has been named assistant chairman, metals research department, Armour Research Foundation, Illinois Institute of Technology.

—o—

**Norman H. Balaam** has been appointed assistant to the vice president and general manager, Kaiser Fleetwings Inc., Bristol, Pa.

—o—

**E. S. Wright** has been named manager of construction, Chemical Plants Division, Blaw-Knox Co., Pittsburgh, and **W. F. O'Neill** succeeds Mr. Wright as general superintendent of construction.

—o—

Additional assistant divisional parts managers appointed by Caterpillar Tractor Co., Peoria, Ill., are **T. A. Dunne,** appointed to the Eastern Division, **J. E. Ferguson** in the Central Division, and **W. R. Owens** in the Western Division.

—o—

**Arthur M. Swigert** has been appointed vice president in charge of manufacturing operations, Universal Products Co. Inc., Detroit, manufacturer of universal joints and propeller shafts.

—o—

Whiton Machine Co., New London, Conn., announces appointment of **Gordon P. Molsen** as sales manager for its Chuck & Machine Tool Division.

—o—

**R. F. Kendall** has been appointed credit manager, Reliance Electric & Engineering Co., Cleveland, in which position he assumes responsibilities formerly carried by the comptroller's office. **Claude V. Harp Jr.,** has joined the Houston, Tex., office as field sales engineer.

—o—

Malleable Iron Fittings Co., Branford, Conn., announces appointment of **J. T. Phelps** as manager of castings sales, succeeding **Arthur H. Jameson,** retired. **Milton L. Hart** was named assistant manager, castings sales.

—o—

**Frank Edwards** has been appointed sales manager, Heater Division, Eaton Mfg. Co., Cleveland. He joined this division in 1946 as sales engineer.

—o—

Niles-Bement-Pond Co., West Hartford, Conn., announces appointment of **Harry Reichert** as acting manager of foreign sales, to carry on the work of **Alexander S. Keller,** vice president and manager of foreign sales, who is on leave of absence for a year.

—o—

Elizabeth Iron Works Inc., Elizabeth, N. J., announces appointment of **Emil Schaeffer** as chief engineer of its Tower Division.

—o—

**Kenneth D. Davis** has been appointed to the newly created position of manager of the ESnail Sales Division, Elastic Stop Nut Corp. of America, Union, N. J.

—o—

**Robert G. Allen** has been elected vice president in charge of the Electrode Division, Great Lakes Carbon Corp. Formerly manager of the division, Mr. Allen continues to make his headquarters at the Niagara Falls, N. Y., plant.

—o—

Colorado Fuel & Iron Corp. has appointed **John S. Hawley** as assistant to the vice president in charge of

ARTHUR M. SWIGERT

ROBERT G. ALLEN

operations. Mr. Hawley, whose headquarters will be in Buffalo, formerly was manager of the company's West Coast subsidiary, California Wire Cloth.

—o—

National Association of Manufacturers, New York, has elected **William P. Witherow,** president, Blaw-Knox Co., Pittsburgh, an honorary vice president for life. Elected national vice presidents are **Clarence B. Randall,** assistant to the president, Inland Steel Co., Chicago; **Thomas J. Bannan,** president, Western Gear Works, Seattle. Newly elected members to the NAM board of directors include **C. E. Erickson,** president, C. E. Erickson Co. Inc., Des Moines, Iowa; **H. P. Bigler,** executive vice president, Connors Steel Co., Birmingham; **Henry B. Neef,** president, Gate City Iron Works, Omaha, Nebr.; and **G. F. Coope,** president, Potash Co. of America, Carlsbad, N. Mex.

—o—

**M. J. L. Schulte** has been appointed general sales manager, Stow Mfg. Co., Binghamton, N. Y. He was with Keystone Bolt & Nut Corp.

—o—

**W. Arthur Smith Jr.** has resigned as engineering sales manager of Carlyle Johnson Machine Co. to engage in business as a manufacturers' representative in New England. His offices will be at 1006 Main St., Hingham, Mass. Specializing in machine parts and mechanical components requiring engineering application, Mr. Smith will institute operations in New England for the Wel-Met Co., Kent, O., manufacturer of molded and sintered metal powder parts.

GEORGE A. DANIELS

*Appointed secretary and treasurer, Hydraulic Press Mfg. Co., Mt. Gilead, O. Noted in STEEL, Jan. 10 issue, p. 46*

MILTON J. STEFFES

*Appointed general sales manager, Super Tool Co., Detroit. Noted in STEEL, Jan. 10 issue, p. 48*

—o—

New officers of National Tool & Die Manufacturers Association, Cleveland, are: **J. J. Kohl,** International Tool Co., Dayton, O., president; **C. W. Holmberg,** A. W. Holmberg & Co. Inc., New York, first vice president; **R. H. Cope,** Bunell Machine & Tool Co., Cleveland, second vice president; **Alfred Reinke,** Gus Reinke Machinery & Tool Co., Hillside, N. J., secretary; and **Jerome H. Stanek,** Stanek Tool & Mfg. Co., Milwaukee, treasurer.

—o—

**H. L. Francis** has been appointed eastern traffic and transportation manager for Koppers Co. Inc., Pittsburgh. Mr. Francis, whose headquarters are at Kearney, N. J., will continue his present duties with the Gas & Coke Division.

—o—

**Robert M. Whitney** has been promoted to advertising manager, Automatic Transportation Co., Chicago.

## OBITUARIES . . .

**A. R. Pfeltz,** 62, vice president, American Can Co., New York, died Jan. 4 at his home in Montclair, N. J., after a long illness. He had been associated with American Can Co. since 1902, and became vice president in charge of purchasing and traffic in 1937. He had been responsible for the supply of sheet metal for the company for more than 30 years, and, in addition, held many other important assignments.

—o—

**Lee D. Mercer,** 74, assistant sales director, Sheet & Strip Division, Republic Steel Corp., Cleveland, died Jan. 11. He had 43 years of association with the steel industry and companies which through consolidations became components of Republic Steel.

—o—

**David A. Nemser,** 51, metallurgist and head of the New England technical section, Development & Research Division, International Nickel Co. Inc., died Jan. 5 at his home in West Hartford, Conn.

—o—

**John J. Bechtold,** 79, president, New York Brass Foundry Co., New York, died Jan. 7. He founded the concern in 1898.

—o—

**A. K. Lewis,** 73, retired assistant to the vice president, Armco Steel Corp., Middletown, O., died Jan. 10.

—o—

**William F. Kemble,** 79, retired director and treasurer, Patino Mines & Enterprises Consolidated Inc., New York, died recently. During World War I, as manager of William Harvey Ltd., tin smelters, partly owned by National Lead Co., he erected the first American tin smelter. He retired from the Patino company in 1940.

—o—

**Ross C. Purdy,** ceramic engineer, died Jan. 6. He was a member of the American Ceramic Society for more than 50 years, and served as its secretary from 1920 to 1946. Immediately preceding this period, he was associated with Norton Co., Worcester, Mass.

—o—

**Charles H. Gallmeyer,** 68, president, Gallmeyer & Livingston Co., Grand Rapids, Mich., died recently. In 1912 he served as treasurer, Valley City Machine Works, Grand Rapids. In 1923 this firm merged with Union Machine Co. to form Gallmeyer & Livingston Co., of which Mr. Gallmeyer was first named treasurer.

—o—

**Marcus J. Margulies,** 60, affiliated with Luria Steel & Trading Corp., Philadelphia, and for the past 12 years secretary of the Philadelphia Chapter of the Institute of Scrap Iron & Steel Inc., died recently.

—o—

**Gordon G. Elster,** 67, general sales manager, Car Division, Canadian Car & Foundry Co. Ltd., Montreal, Canada, died recently.

—o—

**Bernard E. Strader,** 57, vice president, Remington Arms Co., died at Bridgeport, Conn., recently.

—o—

**W. Wallace Kemp,** president, C. M. Kemp Mfg. Co., Baltimore, died recently. He was president and chairman of the board since 1912.

—o—

**A. D. Shankland,** metallurgical engineer on the staff of the operating vice president, Bethlehem Steel Co., Bethlehem, Pa., died recently.

# How Bliss Met Revere's Tough Rolling Mill "Specs"

**Smooth-surfaced non-ferrous strip** to exceptionally accurate, uniform gage...quick, precise adjustment during rundowns...variable, fast rolling speed ...extreme versatility throughout...those were requirements for three new rolling mills that Revere Copper and Brass put up to Bliss.

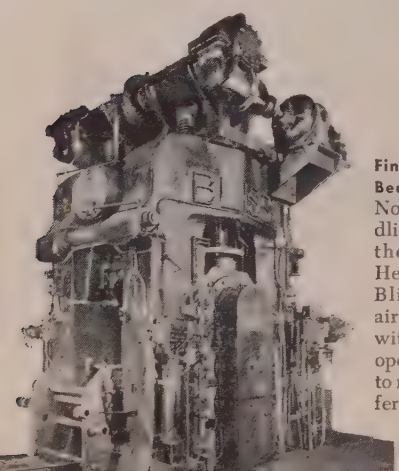
**"We knew what we wanted,"** says H. A. Ray, Assistant Plant Engineer at Revere's New Bedford Works, "and Bliss was able to deliver. On our new intermediate rundown mill there's a collapsible block with vertical-type wrapper with an Up Coiler for heavier gage. We use the Up Coiler for strip from about .125" down to .060"—then we use the block for metal down to .016". This arrangement is compact, and I can tell you it's efficient.

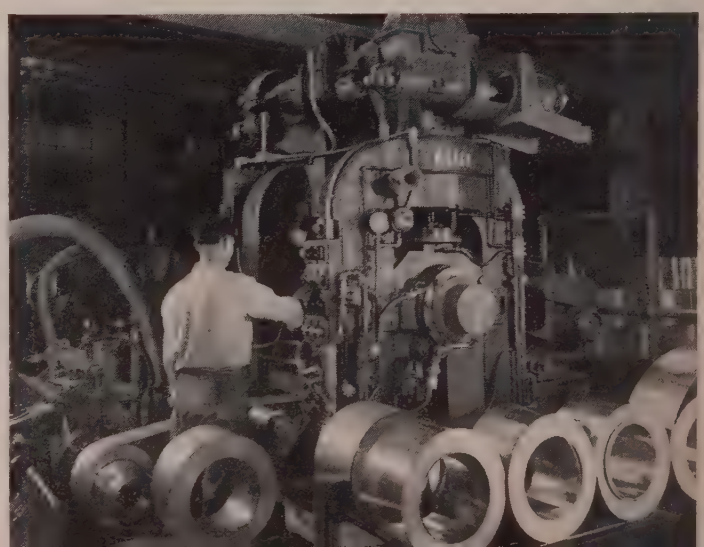
**"Another thing we like** is the air-operated sticker guide that Bliss developed to meet our various width requirements. On our new finishing mill, they gave us air-operated side guides immediately adjustable to handle any width we're running. On that mill, we can roll copper strip down to .005"—true to gage, 24 hours a day."

### Precision Rolling to "Tenths"

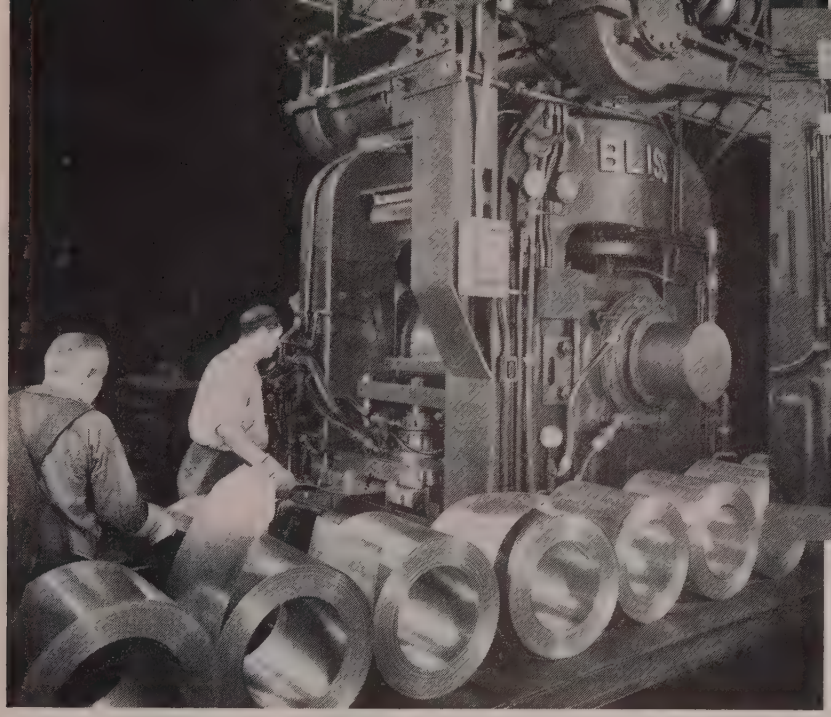
Down in Baltimore, at Revere's Canton Works,

**"Old Faithful"**—This 14" and 29" x 30" 4-high mill for 1st rundown of copper and copper alloy strip has seen continuous service in Revere's New Bedford plant for over 17 years.





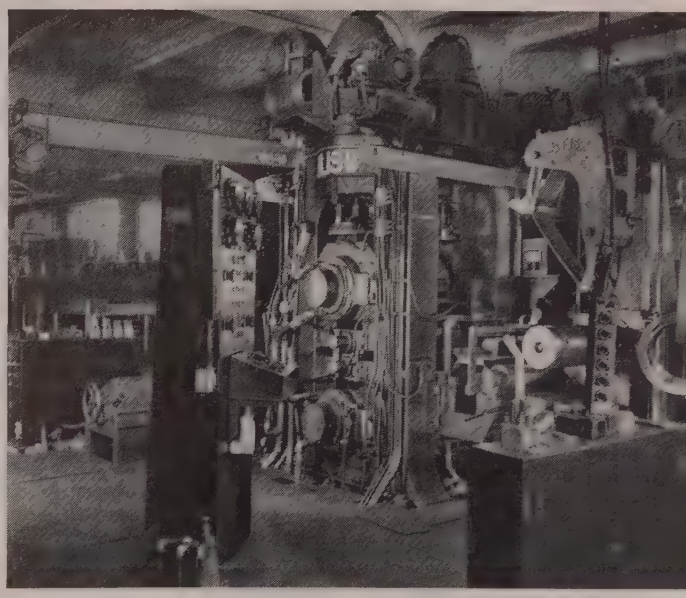
**Finishing Mill at New Bedford Threads Up.** Note the sleeve handling mechanism at the receiving end. Here, too, is another Bliss original—the air-operated sticker with adjustable air-operated side guides to rapidly handle different coil widths.



**Bliss-built Intermediate Rundown Mill** Revere's New Bedford Works. Inset shov close-up view of collapsible block with ve tical belt wrapper in receiving position. Pa tially visible, too, is hydraulic lift table ar pneumatic buggy that minimize handlir problems.

there's an even more spectacular story. Here Revere precision-rolls copper strip to .012″ *within .0002″*—using a Bliss-built mill specially engineered for the job. There's variable, synchronous tension on pay-off and wind-up reel to assist in run-down, and instantaneous control of tension, winding speed and screw-downs from roller's centralized control panel. It's smooth-surfaced strip—double-checked with X-ray Thickness Tester and air micrometers.

**Yes, for the engineered refinements** that make for maximum production—for the rolling mill performance you want, put your problem up to Bliss. You'll get the same keen counsel that's made Bliss the first name in presses for more than 90 years.



**"Tape Mill" at Canton Works** in Baltimore—designed for precision-rolling of copper tape for coaxial cable to gage .012″ within .0002″. X-Ray Thickness Tester mounted on exit side gives constant gage indication and roller's control panel permits immediate correction of adjustment during rolling to hold tolerance.

# E. W. Bliss Company

**DETROIT 2, MICHIGAN**

*Manufacturers of two-, three-, and four-high mills for hot or cold rolling; single stand reversing, or tandem mills for ferrous or non-ferrous metals; cluster mills. Accessory mill equipment furnished complete.*

# FLASH-BUTT WELDED RINGS and BANDS *by* AMERICAN WELDING

Flash-butt welded rings and bands . . . both carbon and alloy . . . prove to be superior. Records show that there is a substantial

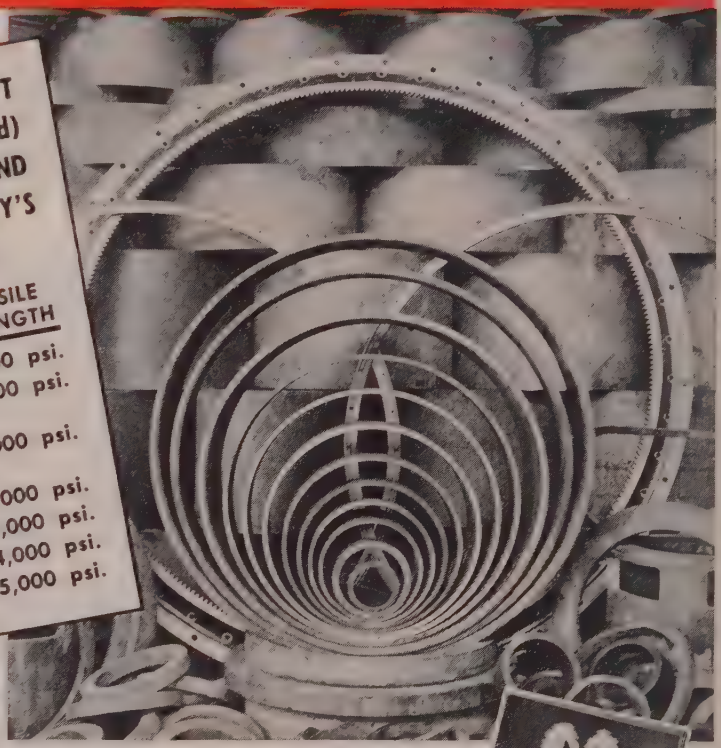
## SAVING IN THE PRICE OF RINGS
## SAVING IN THE COST OF TOOLING

when rings and bands are produced by the American Welding *"Controlled Technique"* process of flash-butt welding.

If you use rings, bands, or any other welded product, send your specifications, quantity, and prints for prompt quotation.

REPRESENTATIVE FLASH-BUTT WELD TEST RESULTS (as welded) FROM AMERICAN WELDING AND MANUFACTURING COMPANY'S RESEARCH FILES.

| MATERIAL | TENSILE STRENGTH |
|---|---|
| Armco Ingot Iron | 47,000 psi. |
| AISI-C-1025 | 71,000 psi. |
| Stainless, Type No. 410 | 76,000 psi. |
| Stainless, Type No. 347 | 91,000 psi. |
| AISI-8630 | 115,000 psi. |
| Inconel-X | 124,000 psi. |
| N-155 | 135,000 psi. |



*Send* for 16 page illustrated booklet

THE AMERICAN WELDING AND MANUFACTURING COMPANY

110 DIETZ ROAD • WARREN, OHIO

# Engineering News . . . AT A GLANCE

**POWERFUL SINGLE-SHAFT DRIVE**—Three 29,000-horsepower General Electric motors hooked up in tandem to a single drive shaft are responsible for the 1500-mile-per-hour wind velocities produced by the huge supersonic wind tunnel unveiled in Cleveland by the National Advisory Committee for Aeronautics. Speed of the winds through the tunnel's 6 x 8-foot test section is regulated by a pliable sheet of stainless steel that forms part of the entrance to the tunnel. This sheet is positioned by means of hydraulic rams that adjust it to varying curvatures to narrow or widen the throat through which the wind is forced.

**MORE PAY LOADS**—Novel method of increasing the pay load of an electric hand truck was developed recently at the Auburn Works of International Harvester Co., Auburn, N. Y. It involves the use of an improvised rack which enables a single truck to handle pallets, skids and carts with equal ease. According to the company, method of attaching the rack to the truck enables it to be folded up out of the way so that the full length of the forks is usable. Upon lowering the rack the truck is quickly converted into a platform model for handling skids. Hooks also are incorporated for towing carts.

**SHAPES SPECIAL SHAPES**—Steel warehouses, of which there are more than 1200 in the country, usually maintain a stock of between 5000 and 7500 shapes, kinds and sizes of steel—often involving an inventory of as many as 20,000 tons. Yet in spite of the number of shapes on hand, requests from customers asking for special shapes continue to increase. To meet this demand, Brace-Muller-Huntley Inc., Syracuse, N. Y., is using a pantagraph type oxacetylene gas cutting unit furnished by Air Reduction Co. By using a 4-torch setup equipped with an electronic tracing device, the machine enables the concern to provide customers any irregular shapes practically on request.

**STEAM BLASTED SCALE**—Descaling process currently employed in the plant of Lukens Steel Co., Coatesville, Pa., for processing clad metals actually reverses the normal oxidation process by first reducing the metal oxide to metal or a lower oxide, leaving original material clean. The method makes use of a sodium hydride bath. Following preheating to a temperature of 700° F—a temperature well below critical temperature of Lukens' products—the plates are lowered into the 700° F sodium hydride bath. After 8 to 20 minutes, they are then cooled in a water quench where the steam generated helps blast loosened scale from the surfaces.

**MORE USES FOR NEW ALLOY**—While 8½ per cent nickel steel (AISI 2800) was commercially developed primarily for engineering structures at low temperatures, it is being found to possess a versatility that fits it for a wide variety of applications at normal temperatures as well. According to International Nickel Co., New York, this alloy has been produced commercially in form of billets and bars, plate, seamless tubing and forgings. Experimental experience indicates it will probably find wide use for sucker rods in certain types of corrosive oil wells and for oil tubing in deep wells. It also has been tried in hammer rods of a large forging hammer, and excellent service has been obtained in a trial installation in solder used in making tin cans.

**NO WASTE ENAMEL**—In reclaiming titanium enamel for further use, technique followed by Westinghouse calls for milling the "reclaim" for 2 hours in a grinding mill that is double charged. This is done so that the fineness of the enamel is not affected. Following prescribed grinding, the reclaim is checked in the same manner as new titanium. When needed for spraying ware, the "saved" product is used without further addition of urea. (p. 64)

**"TAILORED" SLIVERS**—To obtain proper sliver specimens required for metallographic examination of several steels under study, a thin abrasive wheel submerged in water containing a cutting compound was used in the cutting. This operation provided specimens about 3/32-inch square by ⅝-inch long. Then to minimize the effects of cutting, each sliver was carefully alternately hand-ground and etched to needle-like proportions. (p. 66)

**"INTANGIBLE" YET EFFECTIVE**—Color in industry, intangible or not, is gaining in acceptance. Although difficult to evaluate, its "functions" in preventing accidents and promoting efficiency already are beginning to show up in the few surveys that have been completed. In one government bureau, for example, it was found that functional color increased production from 5.5 per cent, in some instances, to 37 per cent in others. In the shops of the New York City transit system, it was found to be instrumental in cutting accidents. Casualty rate dropped 42.3 per cent in 18 months. (p. 73)

**OPEN HEARTH "PARADE"**—First open hearth furnaces built in the 1860's consisted of small 5-ton units—featuring silica sand hearths—a far cry from the 200 to 225-ton giants of today. In 1886 the first successful basic open hearth was born. Built by Otis in Cleveland, it boasted a capacity of 15 tons. Real impetus to basic open hearth furnace steel production, however, came in 1888 when 50-ton basic open hearth furnaces commenced operating at the Homestead Steel Works, Munhall, Pa. After 1920, basic open hearth tonnage soared at a rapid rate, these units producing over 61 million gross tons by 1940. (p. 76)

How to Apply

# TITANIUM ENAMEL to TITANIUM

By JOHN C. SWARTZ
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PICKLE room practice, which permits the application of titanium enamel directly on steel was developed from the steel suppliers suggestions and trial and observation. For this new enameling technique steel must be cleaned of all drawing compound, oil and shop dirt. It must be free of rust and weld scale. It must enter the nickel free of transfer rust and smudge.

A minimum and maximum nickel deposition must be obtained. The steel must be transferred to the neutralizer with the least possible ferrous sulphate coating. With the completion of the pickle cycle the steel should appear clean and free of smudge.

All of this is necessary so that a clean steel is sprayed with no creeping or crawling, that enamel and steel bond is obtained and that there is no blistering from pickle smudge. To obtain titanium steel from the pickle as desired, a cleaner designed to remove in addition to shop dirt and drawing compound, any oil which may be on the steel, is used. Carry-out from this cleaner is then removed in a hot overflowing rinse tank. Drawing compound and dirt is removed in a second cleaner and carry-out is taken out with a hot and then a cold overflowing rinse. Then with the least possible pickling the ware is carried through two acid tanks for rust and weld scale removal. Following a slightly acidic overflowing rinse the steel enters the nickel. From the nickel tank the steel passes through an acidic bath for nickel sulphate and iron hydrate removal. The pickle cycle is completed with two neutralizer baths and a dryer.

Equipment used in our pickle is an automatic high lift pickle machine equipped with 90 arms on 2½-foot centers traveling 5 feet per minute. Each arm has a capacity of 80 pounds of ware.

All of the tanks are 5 feet wide and 6 feet deep. Steam is used for heating the tanks and the dryer is heated with gas burning in a loose muffle. Vertical bag type nickel filter and the leaf type neutralizer filter are located in the millroom.

**Filter Powder Used**—Filter powder used to create a porous coating on the vertical filter bags is prepared by slowly adding the powder to the slurry tank while water is circulated from the slurry tank to the pump and back to slurry tank. After a smooth mix is obtained the slurry is pumped through the filter, thereby depositing a coating on the bags. As soon as the water is returned clear to the slurry tank the filter is cut into the nickel tank. The filter is cleaned once a week and a filter powder addition is made twice weekly.

Table I shows the size of each tank and dryer. Amount of ware which we believe may be adequately cleaned and pickled in this installation is shown in Table II. Operation control of the pickle room is by periodic titrations, temperature measurements, pH measurements, nickel deposition determinations and torsion test trials, Table III. Nickel salts, sodium cyanide and borax additions are made by placing the material in burlap bags which are hung in the tank until the material is dissolved.

Pickle room control tests for solution strength, pH and temperature are made by millroom personnel, Table IV. Plates for nickel deposition determination and torsion tests are prepared by millroom personnel and tested by the main chemical control laboratory.

Important points to keep in mind in preparing titanium steel for enameling are:

1. All grease, oil and shop dirt must be removed in the cleaning operations. If allowed to remain, they will cause crawling, smudging and poor nickel deposition.
2. Rust and weld scale must be removed by pickling without leaving a smudge on the steel. If smudge is formed blistering will result.
3. A minimum of 0.080 to 0.120 grams of nickel per square foot of area must be deposited on the steel for satisfactory enamel and steel bond. If less than 0.080, poor bond will result.
4. Final neutralizer solution should be as mildly alkaline as possbile. If too strong, enamel will be discolored in spots.

We have found that by following the pickle practice just described, satisfactory application of titanium enamel direct on titanium steel is obtained.

**Millroom Practice**—Titanium enamels are expensive, high opacity, hard, fire sensitive enamels which when properly prepared will bond with titanium steel. Due to their high cost, practical economical care must be exercised in handling this material. Since they develop a high opacity in the fire they should be prepared using material which will not tend to reduce this opacity. Their highly desirable hard finish is undoubtedly correlated with their "hard firing" charac-

Presented before the Tenth Annual Forum, Porcelain Enamel Institute

*Modern pickle and millroom practice employed by Westinghouse permit the direct application of titanium enamel on steel*

# STEEL

teristics. This poses a problem in firing them at the same time with enamels which have a firing range that just touches the low side of their firing range. As might be suspected, these firing characteristics present tearing, blistering, and surface smoothness problems.

Only one mill for titanium enamel is used as a very small contamination of zirconium opacified enamel affects color and acid resistance. Time required to mill titanium enamel is about double that required to mill an equal amount of zirconium enamel. Water cooling of the mill is necessary.

Titanium enamel formula is:

| | |
|---|---|
| Frit | 100 Parts |
| Clay | 2.2% |
| Tint Oxide | .8% |
| Setit A | 1/8 |
| Sodium Aluminate | 1/8 |
| Bentonite | 3/8 |
| Potassium Carbonate | 1/4 |
| Sodium Nitrite | 1/4* |
| Urea | 3/16* |
| Gum Tragacanth | 1/16 |
| Water | 32% |
| Fineness | 0.4-0.6 |

* Figured on wet basis and added after milling.

All water used in the enamels is filtered city water. Ordinary unfiltered well water gave the titanium enamels a yellow cast.

Upon completion of grinding the enamel has a specific gravity of about 1.84. This is reduced to 1.76 before unloading. A second water addition is made to help remove all but about ½ per cent of the enamel from the mill. Net specific gravity of the unloaded enamel in the storage tank is between 1.74 to 1.75.

Enamel is removed from the mill by gravity into a 30-gallon pump sump through a 30-mesh screen. The pump forces the enamel through a 2-inch direct line pipe to a 1000-gallon storage tank. The sodium nitrite addition is made to the second sump of enamel before pumping it up to the storage tank. The nitrite is completely dissolved in water and screened through a 200-mesh screen into the sump. Most nitrite contains some foreign matter which a 200-mesh screen will remove.

Four checks are made on the enamel before removing it from the mill. First the enamel is ground to very close limits as can be seen in the formula chart.

The other three tests are made on a sample plate on which the enamel has been applied at 30 grams per square foot. Before spraying, the enamel has had the formula requirement of sodium nitrite added. Unless this addition is made, extremely fine tearing will make color and cleanliness checks difficult if not impossible.

The sprayed test plate is fired in the production furnace. After firing, the enamel is checked for color. Firing is at 1530°F for 4 minutes, 60-foot hot zone, 14-foot chain speed. Color is checked by using 3 standard plates. One shows the maximum permissible yellow cast. The second shows the maximum permissible pink cast, while the third standard is the desired color which lies between the yellow and pink plates.

Only color correction we have ever had to make, is to correct, very infrequently, a yellow cast. This is done by milling ¼ to ½-ounce per hundred (wet basis) of concentrated pink oxide into 4 pounds of enamel in a jar mill and adding this slip to the mill. The unloading water is added with the pink slip and milled for 20 minutes. The enamel is then color-checked again.

After checking the color, cleanliness of the enamel is judged. We have yet to have a dirty mill of titanium enamel. If the first three tests are all right, the enamel is tested for acid resistance.

To fill the spray barrels we first rerotospray all of the return enamel. From the rotospray the enamel passes through a magnetic separator. To this enamel, 2 ounces per hundred Urea and 3 ounces per hundred Urea are added at this time for the amount of new titanium enamel which will be added to the barrel. A 60-mesh stainless steel (*Please turn to Page* 96)

**TABLE I**
**INSTALLATION CHART**

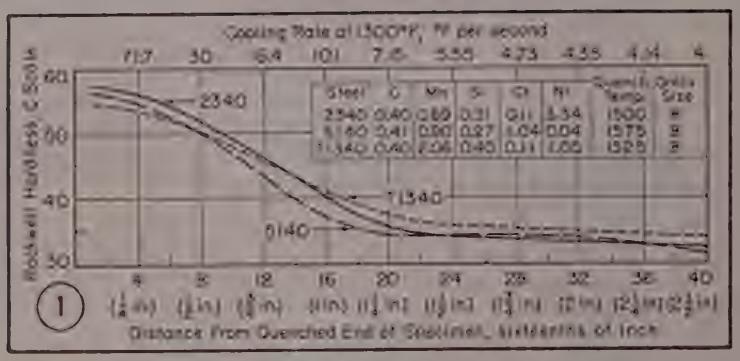
| Tank Number | Solution | Length (in feet) | Capacity (in gallons) | Time in Solution (in minutes) |
|---|---|---|---|---|
| 1 | Cleaner | 20 | 4500 | 3 |
| 2 | Hot Rinse | 20 | 4500 | 3 |
| 3 | Cleaner | 20 | 4500 | 3 |
| 4 | Hot Rinse | 10 | 2250 | 1 |
| 5 | Cold Rinse | 10 | 2250 | 1 |
| 6 | Acid | 18 | 4000 | 2½ |
| 7 | Acid | Semi-circular | 5000 | 1½ |
| 8 | Cold Rinse | 7½ | 1680 | ½ |
| 9 | Nickel | 30 | 6750 | 5 |
| 10 | Acid | 7½ | 1680 | ½ |
| 11 | Neutralizer | 20 | 4500 | 3 |
| 12 | Neutralizer | 13 | 2925 | 1½ |
| | Dryer | 20 | | 3 |

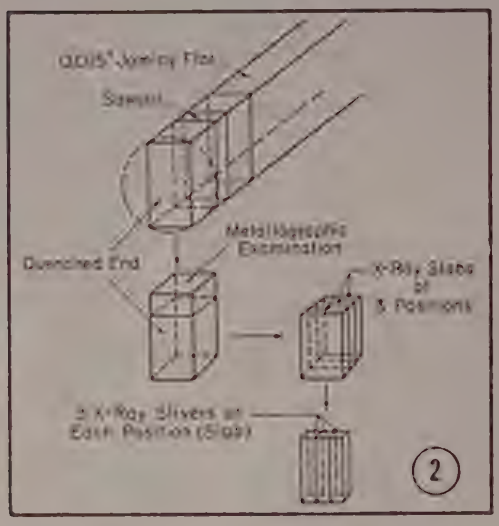
**TABLE II**
**USAGE CHART**

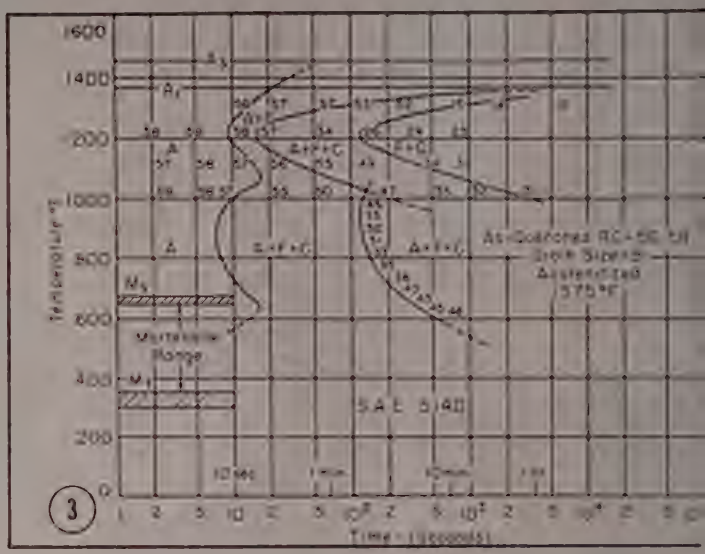
| Tank Number | Solution | Daily Footage (one side) | Usage Limits Days | Usage Limits Footage (one side) |
|---|---|---|---|---|
| 1 | Cleaner | 45000 | 15 | 750000 |
| 2 | Hot Rinse | 45000 | 5 | 250000 |
| 3 | Cleaner | 45000 | 20 | 1000000 |
| 4 | Hot Rinse | 45000 | 5 | 250000 |
| 5 | Cold Rinse | 45000 | 5 | 250000 |
| 6 | Acid | 45000 | 40* | 2000000 |
| 7 | Acid | 45000 | 40* | 2000000 |
| 8 | Cold Rinse | 45000 | 5 | 250000 |
| 9 | Nickel | 45000 | 20 | 1000000 |
| 10 | Acid | 45000 | 5 | 250000 |
| 11 | Neutralizer | 45000 | 5 | 250000 |
| 12 | Neutralizer | 45000 | 3 | 135000 |

*Endpoint is 6% $FeSO_4$ which is reached in approximately the number of days shown.

# Use of HARDNESS


Cooling Rate at 1300°F, °F per second
Rockwell Hardness C Scale
2340
T1340
0140
Steel C Mn Si Cr Ni Quench Temp. Grain Size
2340 0.40 0.69 0.31 0.11 3.34 1500 8
T1340 0.41 0.90 0.27 1.04 0.04 1575 8
0140 0.40 2.06 0.45 0.31 1.05 1525 8
Distance From Quenched End at Specimen, sixteenths of inch
1



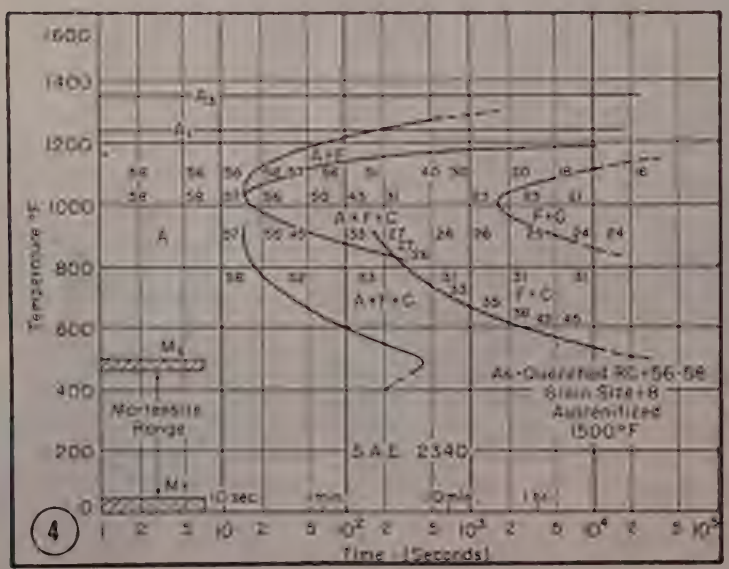




FIG. 1—Jominy hardenability test of steels SAE 2340, 2340 and T1340.

FIG. 2—Method of sampling from Jominy bar showing the successive position of the various specimens in each of the three Jominy bars of FIG. 3.

FIG. 3—Transformation diagram for SAE 5140 steel. As-quenched Rockwell C56-58. Grain size 8. Austenitized 1575° F.

FIG. 4—Transformation diagram for SAE 2340 steel. As-quenched Rockwell C56-58. Grain size 8. Austenitized 1500° F.

# DATA RESTRICTED

By A. R. TROIANO
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*Limitations of the end-quenched hardenability test as a means of comparing various steels are discussed here in connection with an x-ray diffraction study of retained austenite in Jominy test bars and austenite transformation diagrams for steels SAE 5140, 2340 and T1340. Structural variations may exist which are not evident from hardness data alone*

DESPITE the wide use of the Jominy hardenability test as a tool for both steel selection and control, relatively few investigations have been devoted to a systematic study and correlation of the structures produced in such test bars with the isothermal transformation characteristics of the austenite in the same steels. Even less information is available in the nature of a correlation of austenite retention in Jominy bars with the general austenite transformation characteristics under controlled conditions.

Of particular interest would be a careful examination of several steels of widely different chemical analyses, having essentially the same Jominy hardenability. Presented here are the results of a determination of the transformation characteristics of a plain chromium, a plain nickel, and a plain manganese steel, all of approximately equal hardenability; as well as a correlation with the structures and state of retained austenite in Jominy bars of the same steels.

Three steels of types SAE 5140, 2340, and T 1340 were employed in this investigation. The analyses are given in Table I.

The Jominy curves of Fig. 1 demonstrate that the hardenability of these three steels is essentially the same. Total spread is no greater than one may encounter in different heats of the same type of steel.

**Transformation Diagrams** — Methods employed in the determination of the transformation diagrams were much the same as those employed in the many diagrams determined in this laboratory. Briefly, the metallographic specimens were 3/16 x ½ x ⅛-inch and larger when possible, the dilatometer specimens were 1 x ¼ x 1/16-inch, x-ray diffraction specimens were ½ x 1/16 x 1/16-inch. All steels were normalized at 1650° F and austenitized for 30 to 40 minutes in a vertical tube furnace provided with a continuous flow of purified nitrogen. Austenitizing temperature and resulting grain size are indicated on the appropriate transformation diagrams. $A_1$, $A_3$, and $M_s$ temperatures were determined by standard metallographic methods.

Retention of austenite in both the metallographic and Jominy bar specimens cannot be properly examined by metallographic techniques. However, x-ray diffraction methods were capable of supplying at least a qualitative concept of the relative amounts of retained austenite present following various isothermal heat treatments as well as at various positions in the Jominy bar.

General x-ray diffraction techniques employed here have been described in detail elsewhere (1). Method of sampling the Jominy bar for x-ray analysis, in particular, presented some special problems considering that only slight deformation or overheating will decompose the retained austenite. Fig. 2 illustrates method of sampling and shows the geometric relation of various specimens in each of the three Jominy bars of Fig. 1. The metallographic examination was made just under the hardness flat. Beneath this and extending to the opposite flat, the x-ray slabs were cut approximately 3/32-inch wide. Thus, for each metallographic specimen, at least three positions at known distances from the quenched end could be examined by x-rays. In addition, each x-ray slab provided three x-ray sliver specimens, thus allowing two check specimens at each position. All cutting of specimens was performed with a thin abrasive wheel submerged in water containing a cutting compound. The x-ray specimens after cutting were approximately 3/32-inch square by ⅝-inch long. To minimize the effects of cutting, each sliver was carefully alternately hand-ground and etched to needle-like proportions.

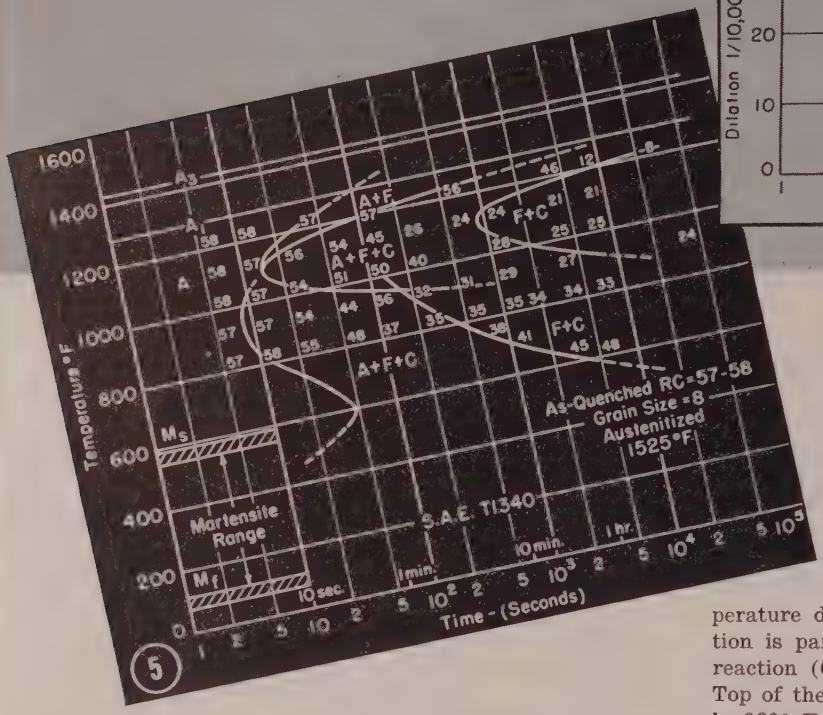
Transformation diagrams for the three steels investigated are shown in Figs. 3, 4 and 5. The diagrams have been drawn in the conventional manner where the beginning line indicates approximately less than ½ per cent transformation and the ending line somewhat more than 99 per cent decompositon of the austenite.

**Similar Features**—These diagrams exhibit many features of similar and other steels that have been presented (2), (3), (4), (5). Of greatest interest are the variations between these three steels of compar-

TABLE I
CHEMICAL COMPOSITION OF STEELS INVESTIGATED

| Type | C % | Mn % | Si % | Cr % | Ni % |
|---|---|---|---|---|---|
| SAE 5140 | 0.41 | 0.90 | 0.27 | 1.04 | 0.04 |
| SAE 2340 | 0.40 | 0.89 | 0.31 | 0.11 | 3.34 |
| SAE T 1340 | 0.40 | 2.06 | 0.40 | 0.11 | 0.05 |

HARDNESS DATA RESTRICTED



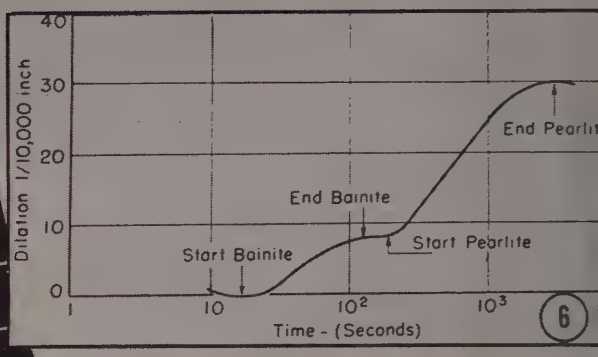




*Fig. 5—Transformation diagram for SAE T1340 steel. As-quenched rockwell C57-58. Grain size—8. Austenitized 1525°F*

*Fig. 6—Dilatometer curve for SAE 5140 steel. Reacted at 1010°F*

*Fig. 7—Dilatometer curve for SAE 2340 steel. Reacted at 935°F*

*Fig. 8—Dilatometer curve for SAE T1340 steel. Reacted at 935°F*

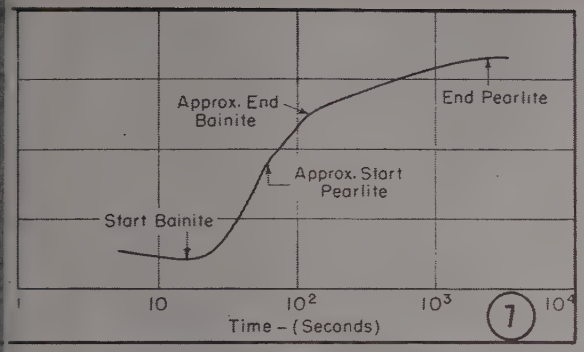
able hardenability. Steel SAE 5140, Fig. 3, illustrates the case where the pearlite and bainite reactions are clearly separated with respect to time but overlap with respect to temperature. Top of the bainite reaction in this steel is at approximately 1035° F, and the bainite reaction exhibits the usual dependence upon temperature for the amount of austenite transformed by this reaction. This austenite transformation will vary from zero at the top of the bainite temperature range to 100 per cent at some lower temperature as shown repeatedly in the literature. In the upper temperature range of bainite formation, the remaining austenite will transform by what is presumably a low-temperature pearlite type of reaction.[1] This is indicated in the transformation diagram in the neighborhood of 1000° F, where there are two sets of beginning and ending curves, the first set for bainite and the second set for pearlite. Note that the ending line for the bainite reaction does not indicate complete decomposition of the austenite. The dilatometer curve of Fig. 6 clearly indicates the time-separation between the bainite and pearlite reactions at 1010° F.

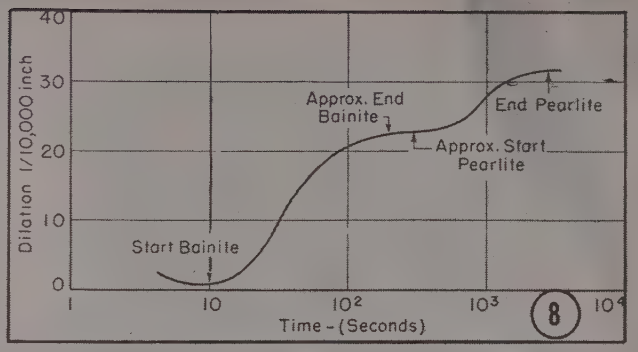
Behavior of steel SAE 2340, Fig. 4, differs from the above. Here the pearlite and bainite reactions almost completely overlap with respect to both time and temperature; although definitely present, the temperature dependence of the extent of bainite formation is partially masked by the overlapping pearlite reaction (6), as it is in plain carbon steels (3), (7). Top of the bainite range is indicated at approximately 960° F. Thus in the temperature range from approximately 800 to 960° F, there is a time interval in which both reactions will occur simultaneously. For example, at 935° F the transformation of the austenite is initiated by the bainite reaction, later the pearlite reaction starts and both proceed simultaneously, following which the bainite reaction ceases (temperature dependence) and the transformation of the austenite is completed by the formation of pearlite. Dilatometric evidence for this phenomenon is apparent in Fig. 7.

Transformation characteristics of SAE T 1340 are indicated in Fig. 5. Behavior of this steel may be most briefly described as being between SAE 5140 and SAE 2340. That is, over a portion of the bainite temperature range (1030 to 940° F) there is overlapping of the pearlite and bainite reactions with respect to time as well as temperature; but approximately below 940° F to about 775° F, the two reactions are separated with respect to time. The dilation curve of Fig. 8 indicates the nature of the transformation kinetics at approximately the maximum temperature where the pearlite and bainite reactions are separable in this steel. Fig. 9 typifies the microstructure obtained in a temperature region where the two reactions overlap. The light constituent is bainite and possibly some of Hultgren's (5) paraferrite while the dark-etching constituent is a form of low-temperature pearlite.

Small, water-quenched x-ray diffraction specimens of SAE 5140 and SAE T 1340 did not reveal the presence of any retained austenite. On the other hand

1. An analysis of the reaction kinetics of the transformation of austenite remaining after partial bainite formation over the entire bainite temperature range is nearing completion. This will include a precise determination of the temperature at which the bainite raction achieves complete decomposition of the austenite in these as well as other steels.




similarly treated specimens of SAE 2340 definitely yielded indications of a slight amount of retained austenite. Retention of austenite at room temperature was investigated after partial bainite formation over the entire bainite temperature range. It is a well-established fact that the formation of bainite will enhance the stabilization of austenite. As expected, all three steels exhibited the presence of retaind austenite after partial transformation of the austenite to bainite.

**Results of Study**—Results may be summarized briefly as follows:

1. In general, austenite will be retained at room temperature after partial transformation to bainite.
2. For each steel, partial reaction in the upper bainite temperature range is more effective in retaining austenite than at lower temperatures for approximately equal amounts of bainite formation.
3. For analogous treatments, SAE 2340 will retain slightly more than SAE T 1340, and substantially more than SAE 5140.
4. Overlapping of the pearlite and bainite reactions will reduce the allowable isothermal holding time which will result in austenite retention.

TABLE II

RETENTION OF AUSTENITE IN JOMINY SPECIMENS

| Distance from Quenched End | X-ray* Retained Austenite | Cooling Velocity from Jominy Chart |
|---|---|---|
| **SAE 2340** | | |
| $\frac{1}{16}$ inch | 3 | 600 °F/sec. |
| $\frac{1}{4}$ | 4 | 72 |
| $\frac{11}{16}$ | 5 | 19 |
| 1 | 7 | 10 |
| 1¼ | 10 | 7.2 |
| 1½ | 9 | 5.6 |
| 2 | 9 | 4.4 |
| 2½ | 5 | 4.0 |
| **SAE 5140** | | |
| $\frac{1}{16}$ inch | 1 | 600 °F/sec. |
| $\frac{1}{4}$ | 1 | 72 |
| $\frac{11}{16}$ | 2 | 19 |
| 1 | 2 | 10 |
| 1¼ | 1 | 7.2 |
| 1½ | 0 | 5.6 |
| **SAE T 1340** | | |
| $\frac{1}{16}$ inch | 1 | 600 °F/sec. |
| $\frac{1}{4}$ | 3 | 72 |
| $\frac{11}{16}$ | 4 | 19 |
| 1 | 5 | 10 |
| 1¼ | 7 | 7.2 |
| 1½ | 7 | 5.6 |
| 2 | 6 | 4.4 |
| 2¼ | 3 | 4.1 |

* Arbitrary numbering system where 10 represents the maximum intensity of the austenite x-ray reflections which were observed within this series of tests. Qualitative only.

Results reported here were obtained by sectioning identically the same Jominy specimens that yielded the hardenability curves of Fig. 1.

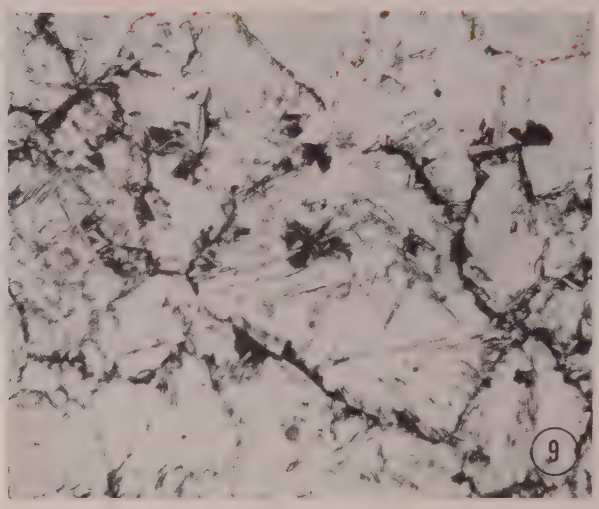
It is possible to retain austenite at room temperature after partial bainite formation even in steels which do not normally retain austenite on direct, rapid quenching to room temperature. It is a logical step to conceive that a "slack-quench", which usually involves partial decomposition to bainite on cooling, will result in some austenite retention. The Jominy test bar affords an excellent opportunity to examine both the microstructural and austenite retention characteristics at various cooling velocities, which may be subsequently correlated with the condition existing in the interior of a quenched section (8), (9).

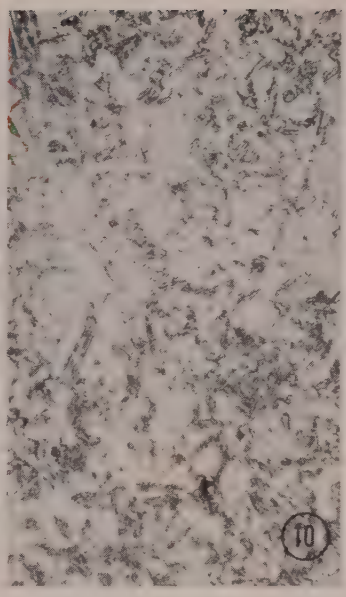
Results of the retained austenite investigation in the three Jominy bars are summarized in condensed form in Table II. It should be emphasized that the tabulation of retained austenite is based upon an arbitrary numbering system, where 10 represents the maximum intensity of austenite lines observed in any of the steels at any position in the Jominy bar. The method is qualitative but adequate to indicate the trends. An absolute, quantitative analysis would be highly desirable.[2] It is difficult to estimate the actual volume of austenite retained. However, if one assumes that the minimum quantity of austenite that may be detected by x-ray diffraction methods is of the order of ½ to 1 per cent, it follows that the maximum (see Table II) may be as much as 5 to 10 per cent or more.

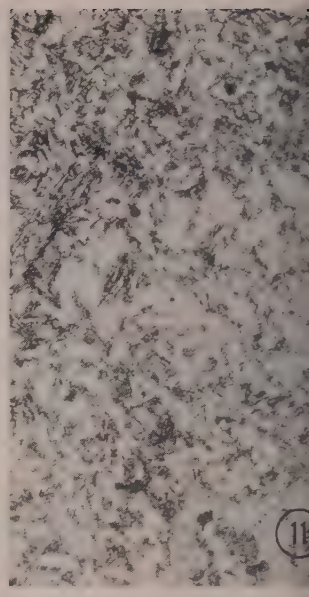
It is apparent, from Table II, that the amount of retained austenite increases as one proceeds along the Jominy bar, attains a maximum value and then decreases for all three steels. SAE 2340 retains much more austenite than SAE 5140 and slightly more than SAE T 1340 at all corresponding positions on the Jominy bar. In addition, the maximum of retained austenite in SAE 2340 and SAE T 1340 occurs in the neighborhood of 1¼ to 1½-inches in the Jominy bar; while for SAE 5140 it occurs at ¾ to 1 inch. SAE 5140 at 1½-inches does not retain any austenite,

2. Recently, such a method has been developed (10), which unfortunately is not applicable to cases where ferrite, bainite, pearlite, etc., may be present.

HARDNESS DATA RESTRICTED




while SAE 2340 and SAE T 1340 each retain almost their maximum of austenite at this position.

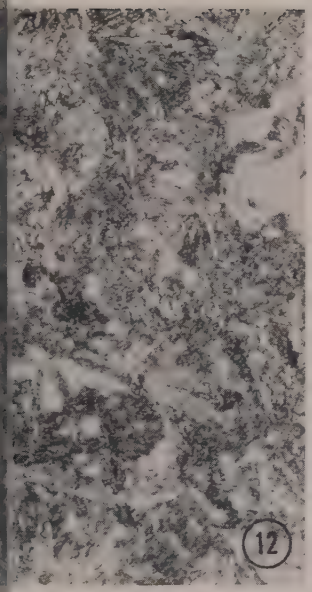
**Metallographic Examination**—In addition to the x-ray analysis, a complete metallographic examination of the three Jominy bars was performed. At all equivalent positions on the Jominy bar beyond ⅜-inch, SAE 5140 indicated the presence of substantially greater decomposition of the austenite to bainite, ferrite, etc., than did SAE T 1340, and SAE T 1340 in turn slightly more than SAE 2340. Figs. 10 to 13 inclusive demonstrate the type of structures obtained at two corresponding positions on the Jominy bar for SAE 2340 and SAE 5140. At the 1-inch position on the Jominy bar, SAE 2340 steel shows (Fig. 10) approximately 40 to 50 per cent decomposition of the austenite to bainite; at the 1½-inch position( Fig. 11) the structure is composed of approximately 75 per cent bainite. Steel SAE 5140 at 1-inch (Fig. 12) is mostly bainite, and at 1½-inches (Fig. 13) is completely decomposed to bainite, ferrite and some pearlite which is evident as the dark-etching constituent. The matrix in all cases is composed of martensite and the retained austenite. Steel SAE T 1340 follows the same general pattern with a transformation behavior which embodies the characteristics of both of the other two steels. It becomes apparent that the microstructural characteristics correlate well with the retention of austenite in the three Jominy bars.

**Discussion**—No fundamental difference in the mechanisms of decomposition of the austenite in these three steels was observed despite an appreciable apparent difference in external form of the three transformation diagrams.[3] All three steels exhibited a normal type of pearlite transformation, typical bainite reactions as discussed in the text, and characteristic behavior of martensite formation. The important difference lies, in each case, in the relative position of the pearlite and bainite reactions with respect to time and temperature, and also on the temperature of the martensite transformation range. These factors will, of course, exert a vital influence on the nature of the transformation products on cooling at less than the critical cooling velocity. The overlapping of the pearlite and bainite reactions with respect to temperature in SAE 2340 and, to a lesser extent in SAE T 1340, appears to be a direct consequence of the effect of nickel and manganese in lowering $A_1$ and the pearlite range to a greater extent than the bainite range.

It has been shown that partial transformation of austenite to bainite in the upper bainite temperature range is more effective in retaining austenite than are lower temperatures. This phenomenon appears to be consistent with other recent studies on austenite stabilization. It has been demonstrated (11) that tempering retained austenite at successively elevated temperatures progressively increases stabilization on subsequent cooling. It has been suggested that stabilization may be correlated with stress relaxation (12) as the result of the similarity in activation energies for both processes. On the other hand, the effect observed here does not coincide well with other indirect evidence (13), which indicates that $M_s$ may be lowered more than 200° F in a 0.12 per cent carbon, 3.8 per cent manganese steel, as the temperature of bainite formation is lowered. However, in this latter work it is not possible to separate the time, amount of bainite formed, and temperature variables. In all cases, the lower temperatures involved longer times and more transformation to bainite prior to martensite formation.

The increase in retained austenite as one proceeds back from the quenched end of the Jominy bar is consistent with the isothermal results. More bainite forms as the cooling velocity is decreased. However factors other than the formation of bainite must contribute to the observed retention of austenite, especially near the quenched end of the Jominy bar. At cooling velocities of 600° F or 79° F per second

3. The diagrams have been drawn in a manner to minimize the apparent differences in form by indicating the beginning and ending times for the reactions even at temperatures where they overlap.



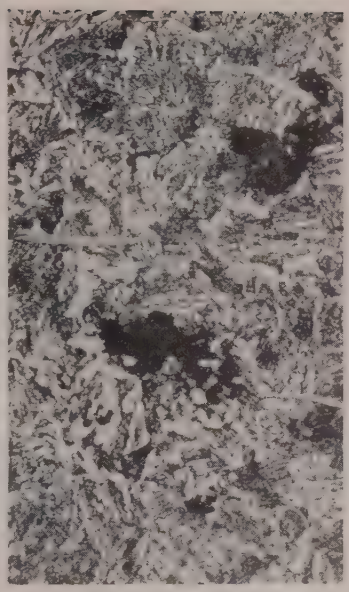


*Fig. 9—Photomicrograph of SAE T1340 steel, reacted at 1000°F for 100 seconds. Etched 4 per cent Nital. X500*

*Fig. 10—Photomicrograph of SAE 2340 steel, 1 inch from quenched end of Jominy bar. Etched 4 per cent Nital. X500*

*Fig. 11—Photomicrograph of SAE 2340 steel, 1½-inches from quenched end of Jominy bar. Etched 4 per cent Nital. X500*

*Fig. 12—Photomicrograph of SAE 5140 steel, 1 inch from quenched end of Jominy bar. Etched 4 per cent Nital. X500*

*Fig. 13—Photomicrograph of SAE 5140 steel, 1½-inches from quenched end of Jominy bar. Etched 4 per cent Nital. X500*

no bainite is formed on cooling[4]; yet cooling at these velocities promotes stabilization (see Table II). This phenomenon may be accounted for by either or both of two phenomena. One, that stabilization in some steels may be promoted by holding in the subcritical austenite range without decomposition (14) and second, that stabilization is enhanced by slow cooling through the martensite range. This latter effect, although recognized for some time, has only recently been demonstrated in convincing fashion (10).

Decrease in retained austenite back in the Jominy bar can be directly correlated with the fact that at the slower cooling velocities more decomposition at the higher temperatures occurs on cooling, until eventually no austenite is available for retention and transformation to martensite. The metallographic examination (for example, see Figs. 10 to 13 inclusive) affords vivid confirmation of this conclusion. It is further evident that, although these steels possess similar Jominy hardenability curves, the relative proportions and even the nature of the structures present at corresponding positions on the Jominy bar may be widely different. Obviously, various proportions of the same and/or different constituents may balance to give approximately equal hardness values.

The relatively soft retained austenite undoubtedly plays an important role in this behavior in steels SAE T 1340 and especially SAE 2340. For example, the expected higher hardness caused by the greater amount of martensite back in the Jominy bar in these steels, as compared to SAE 5140, presumably is masked in part by the larger amount of retained austenite present. It follows that the Jominy curve, as soon as it departs from a straight horizontal line representing essentially 100 per cent martensite, is seriously limited as a tool for comparison of various steels even at comparable hardenability, since variations in structures may exist which are not evident from hardness data alone.

4. A series of small specimens for each steel was cooled at various velocities, the cooling curves recorded and transposed to the isothermal transformation charts indicating that at 79° F per second or faster, no part of the cooling curve touched any beginning line on the transformation chart. In addition, all specimens were examined metallographically and by x-rays. These data are not reported here since they are in complete agreement with the Jominy bar analysis and add nothing to the conclusions.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ACKNOWLEDGEMENT

The author wishes to acknowledge the helpful assistance of E. F. Bailey. The co-operation of E. G. Mahin, head, department of metallurgy, University of Notre Dame, is appreciated.

# Seen and Heard in the Machinery Field

By GUY HUBBARD
*Machine Tool Editor*

**EXTRUDED FORGINGS:** I am writing the copy for this page at Detroit, during an interlude in the 1949 annual meeting of the Society of Automotive Engineers. As has been true for many years, I am attending this big meeting of SAE to "scout out" manufacturing methods which are indicative of significant trends in production metalworking. My good friend Art Allen, Detroit editor of STEEL, is the man who interprets the broad automotive phases of these meetings.

Although the meeting still has several laps to go as I write this, I am inclined to think that I have put my finger on something of great production significance in a paper by Claud L. Stevens, supervisor of quality control, and Gustav Vennerholm, metallurgist, Ford Motor Co. This is an exposition of practical progress in hot extrusion methods in manufacture of automotive forgings—including such items as poppet valves and front wheel spindles.

The technique, which has been under development by Ford for more than 20 years, can be compared to the familiar process of making tooth paste tubes by causing metal to flow under pressure in closed dies. The difference is that hot steel replaces the tin-lead composition of the tooth paste tube, requiring strong, heat resisting dies, powerful presses and close attention to metallurgical considerations both in dies and steel to be extruded and to heating of material.

The authors report savings of steel as great as 30 per cent; large savings in capital investment in machinery which are reflected in 80 per cent saving in floor space required; saving in labor of 65 per cent; and 40 per cent saving in die cost. Among other items now under consideration for extrusion are main shaft gear forgings for transmissions, the rear axle driving pinion forging and the rear axle shaft forging. Forging may be an ancient art but certainly it is anything but a static art in the automotive industry.

**BROADENED SCOPE OF NMTBA:** In the January 3, 1949 issue of STEEL, brief mention was made of a change in the constitution of the National Machine Tool Builders' Association to allow membership to organizations manufacturing "metal forming machines". Heretofore membership has been limited primarily to those building machines which produce parts "by removing metal progressively in the form of chips". That has included makers of grinding machines, although many years ago considerable doubt existed as to whether they were eligible. Microscopic examination of grinder sludge settled that in the affirmative.

The new clause in the constitution sets forth that: "A metal forming machine tool is a power-driven machine—not portable by hand—used to press, forge, emboss, hammer, blank or shear metal". Not included, however, are die casting machines, extruding machines, rolling mills or welding equipment.

Those concerned with the overall picture of metalworking as practiced in America—particularly in the mass production industries—long have been conscious that the line of demarkation between those machine tools which remove metal in the form of chips and those machines which create parts "by pushing the metal around", rapidly has been fading.

For example, in automobile plants the same men who specify machine tool installations also in many cases specify installations of stamping, forming and forging machines. In these days when metals—including steel—are scarce and expensive, they naturally have been paying increasing attention to the possibilities of getting more of the metal into the product and less into the chip bins. That is true particularly of "roughing" operations, but not altogether so—as witnessed by advances in coining and roll threading.

That the machine tool builders themselves have been conscious of this trend is indicated by the fact that of the 174 members listed in the NMTBA directory, 22 companies already are building machines of one kind or another which "push metal around". Some of these machines which originally were side lines have become major factors in the activities of these companies.

As a result of the broadened policy on the part of NMTBA, influence of this association not only in Washington, but throughout the world should be very greatly enhanced. A considerable increase in membership should result. The interest and scope of the meetings of the association should be even greater than has been true in the past. Co-ordination of machining methods with "plastic working of metals" should be furthered—to mutual advantage.

Last but by no means least, the next National Machine Tool Show will be more completely representative of the American system of manufacturing than ever has been the case in any previous show staged by the association.

**EVALUATING AUTOMATICS:** Ted Loudon, advertising manager, Cone Automatic Machine Co., Windsor, Vermont, has just presented me with a copy of a "Comparison Chart for Multiple Spindle Automatics", which now cause me to understand why George Pratt, sales manager of that company, talked in his sleep when I shared a room with him at Cornell University last July.

This 34 x 22 inch chart, which might be likened to a king-size "shopping list", breaks down automatics into ten "ability characteristics" (Chip Disposal for instance), then analyzes each of those main heads into all the elements involved.

By FABER BIRREN
*Industrial Color Consultant*

# COLOR in Industry

## . . . found to have practical benefits

PRACTICAL benefits of color in industry are beginning to grow apparent. The novelty of a resplendent factory has run its course, for the advantages of color are now being well proved through scientific studies and case histories.

The use of color or music or any such emotional stimulant should, in the American system of business, favorably affect profits or savings. Any fanfare—such as color—must have a practical basis and not alone bring delight to employees.

A few years ago color was brought into industry to perform a number of functional tasks. With it, lighting was to be improved, eyestrain relieved. A better working environment was to increase production, promote the best of labor relations, reduce absenteeism and accident frequencies.

Probably much has been accomplished. This, however, is not always easy to determine. In a survey conducted by the National Industrial Conference Board, some 350 organizations reported experience on the use of color. "Few statistics are available on the use of color in industry, and many of these companies were unprepared to evaluate their programs because of the difficulty in measuring the effects of a service as intangible as color. "The findings of the report, therefore, had to be concerned largely with generalities: 33.8 per cent were "entirely satisfied," 41.2 per cent "well satisfied," 4.4 per cent "not very well satisfied," 1.5 per cent "not at all satisfied," and 19.1 per cent had "no opinions" to offer.

Yet color in industry gains acceptance. Intangible or not, its use increases with time. Being visually impressive if not statistically so, color holds a definite fascination and stimulates a sort of inner-conviction that it must be good because it looks so appealing.

Fortunately, some users have tempered credulity with research. The Public Buildings Administration and the U. S. Public Health Service recently published the result of a 2-year study. An office in the Bureau of Internal Revenue was newly relighted and all walls and equipment refinished in tones of green and gray. Although the tasks of the employees changed somewhat during the course of the experiment, researchers found reason to conclude that production rates increased from 5.5 per cent in some instances to 37 per cent in others.

In cash value, a 5.5 per cent production improvement has been equivalent to a saving on gross payroll of $13,229.00 among some 95 government employees. Because this figure is a credible one, it may be stated (from this experiment at least) that right illumination and right color have been worth about $139.25 annually per employee. American industry may well use color to advantage and profit in many cases where light levels and color effects are found to be below standard.

Controlled tests of this sort have not often been made. The emotional factor in color all too frequently leads to prejudiced conclusions. Industry understands

MINE ROPE INSPECTION: Making a last minute check on rope diameter is the operator of a wire rope testing machine in the Rope Testing Laboratory of the Ontario (Can.) Bureau of Mines. With maximum straining capacity of 1,000,000 pounds, the machine is delicate enough to permit load readings as low as 25 pounds. Laboratory has made many thousands of tests of rope samples forwarded to it. Extension, torsion and lubrication of inner strands of wire are checked every 6 months until rope is condemned. The pictured rope will be strained to the breaking point around 300,000 pounds

this but seems willing to enhance the working environment without having specific data to justify painting costs. Simply, the plant looks so much better.

Production and morale are difficult to measure. Yet there is one rather sure check on the value of color. This is in the field of safety and the objective record of accident frequencies. Lost-time accidents are necessarily a part of business accounting. They have cash values in payments for compensation, medical service, lost production and the like. Industry knows the price of injury and has a good knowledge of it.

Hence the story of color as applied to the shops of the New York City Transit System may be accepted, without emotional prejudice, as a fair and reasonable evaluation. During the winter of 1946 an exhaustive study was made of the facilities, equipment, machines, operations and accident hazards of all shops. From this analysis a standard color code for safety practice was developed.

Yellow is employed for so-called strike-against, stumbling and falling hazards, for crane hooks, projections, car stanchions, pit edges. Orange is used to mark the dangerous parts of cutting and forming devices, exposed rails and wires.

Blue (as in the railroad industry) marks equipment cut down for repair. It is specified for switch boxes and controls in general to assure caution. Green is used on first aid cabinets, stretchers, gas masks. Red is reserved exclusively for fire protection.

This color selection respects established traditions but has been scientifically checked to make allowance for the high frequency of color blindness (about 8 per cent) among men. The most vital colors, yellow, orange and blue, were all found to be readily distinguishable by the average color-blind person.

The code was published by Du Pont in February of 1944 and later was adopted in substantial part by the American Standards Association (July, 1945). It has since been broadly applied by American industry and is mandatory in all shore establishments of the U. S. Navy.

Program of the New York City Transit System was put into effect during the early part of 1946. So that its benefits might be quickly applied, union permission was granted to let the workers themselves wield paint brushes. Men familiar with special equipment and machines, and with shop hazards, became painters. Within a short period all shops had been thoroughly rehabilitated. The work was carefully checked to assure consistency.

With the color plan as part of the accident prevention program of the Board of Transportation, the Safety Department also initiated a supervisory training program. Foremen, assistant foremen and supervisors are today being given a ten-week course in safety practice. Two-hour classes are conducted for which the men are paid and for which they receive a certificate signed by William Reid, chairman of the board. Similarly, a course in first aid, designed to train all employees, has also been undertaken.

That the resourceful use of color and proper safety training will pay real dividends may now be dramatically stated from the experiment. Accidents in the shops of the New York City Transit System began to fall off at once. Eighteen months after the introduction of the color code they had dropped 42.3 per cent.

This, of course, has had its humanitarian aspects in fewer injuries, broken bones, sprains and amputations. Yet to management it also has a mighty favorable dollar value.

Accidents are costly. Among civilian employees the federal government values them at $1,044.00 each. Using reliable figures and applying them to the 38,000 employees of the New York City Transit System, a 42.3 per cent reduction in lost-time accidents is equivalent to an annual saving in excess of $500,000. The program, in fact, has exceeded most expectations. Its benefits have been far-reaching indeed and will undoubtedly offer a real contribution to the general field of safety.

The accident problem, however, is not to be solved by color alone. It is no substitute for physical guards, for a training program that forcibly impresses the right discipline upon the worker.

Yet to the great credit of color is the fact that it creates visible symbols and reminders. The brightness and appeal which it brings into industry makes any hazard a more or less cheerful thing to behold—one which has an emotional impact to it and therefore is not easy to forget.

In the New York City demonstration, the fact that color has been put to use is apparent on sight. Because it has been placed about in shops to distinguish hazards, not for any purposes of decoration, it shouts no cries of wolf.

Today safety instruction among supervisors and workers has taken on greater significance, thanks to color. Management in inspecting its plants may see what has gone into the price of a coat of paint. Back at headquarters it may likewise study its accident-frequency reports and calculate savings.

—o—

"Development of Low - Weight Forgings" is the subject of a 15-page illustrated booklet published by National Machinery Co., Tiffin, O. It is National Forging Talk No. 82, the reprint of a paper read before the SAE national passenger car and production meeting in Detroit by J. H. Friedman, vice president and general manager of the company.

# One product, well made

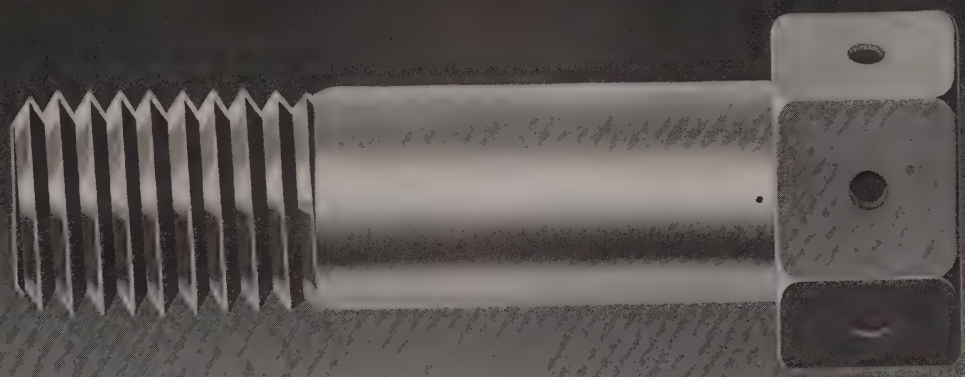

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*Fig. 1—Back wall view of open hearth furnace structural steel showing sloping back wall, buckstays at tap hole area and start of brick work on bottom of hearth—also water cooled skew-back channel for roof*

# PRODUCTION OF OPEN HEARTH STEEL

By L. F. REINARTZ
*Manager, Middletown-Hamilton Division*
Armco Steel Corp.
Middletown, O.

*The first open hearth furnaces built in the 1860's were small five-ton units—having silica sand hearths—a far cry from the 200 to 225-ton giants of today. Of total present day annual ingot capacity of 94,233,460 net tons of ingots and steel for castings, over 91,240,000 net tons come from open hearth furnaces*

## PART I

PROGRESS of modern civilization has been largely based on the increasing universal use and distribution of steel in its various forms.

From earliest history, mankind has striven to improve the tools of industry and the weapons of war. Nations which have controlled the iron ore resources of the world at any given time have been able to dictate to less fortunate states.

This development has been so rapid, particularly in the United States, in the last few decades that the mechanical luxuries of a few wealthy families in the early years of the 20th century have now become household necessities of the average citizen. It is only necessary to refer to the wide distribution and use of automatic washing machines, refrigerators, enameled stoves, radios, phonographs, steel kitchen utensils, sweepers, steel furniture and many other items in the home, in addition to automobiles, steel houses, tractors and farm equipment, as well as novel and intricate machinery found in industry. All these, and many others, have helped to remove hard toil from the backs and limbs of our home, farm and industrial workers, and have helped put control of the machines of industry and commerce in the workers' brains. Safety, good housekeeping, hours of work, and working conditions have been improved by these many changes.

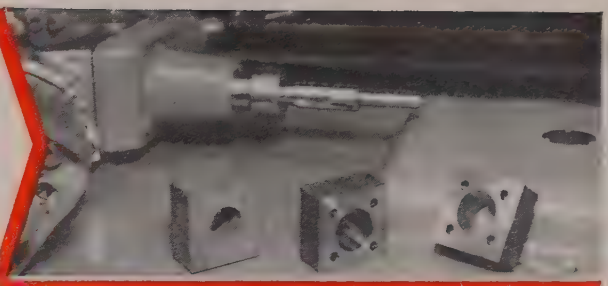
The demand of our people, under the helpful influence of a free economy, for more and better living has spurred on industrialists to devise new methods of steel manufacture which would increase production per worker per furnace, or production per other equipment, as well as decrease the cost of manufacture.

It is significant that four methods of steel manufacture in tonnage lots should have been developed within a relatively short period of time, namely, the acid and basic open hearth, the bessemer and the electric furnace melting process.

A discussion of the electric melting process will be eliminated because it was not, in the early days, an economical method for the production of large ton-

## Do it QUICK:

14 machining operations* in 1.49 minutes on this aluminum bronze cam block blank.



## Do it ACCURATELY:

On this job, boring, facing, drilling and reaming are accomplished not only at maximum speed but with the exactness specified on the blue print.

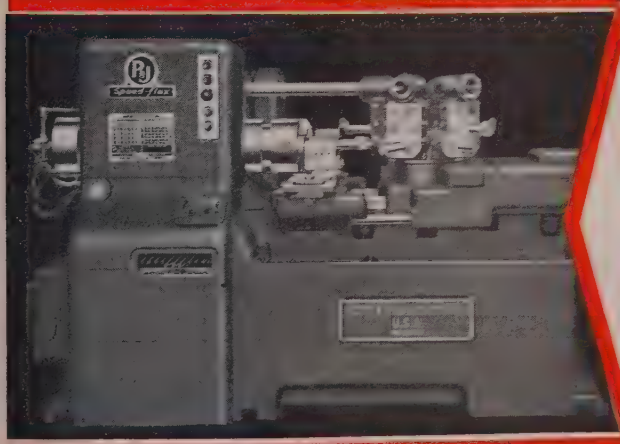
## Do it ALL:

Here's the tooling. *One* setting does the trick. The recessed side of the blank is presented to the spindle and gripped on O. D. with 3 chuck jaws. Then:

1st T. F. — Rough bore hole
Rough face, one side
2nd T. F. — Finish bore hole
Chamfer hole
Finish face, one side
3rd T. F. — Ream hole, 1⅜" dia.
4th T. F. — Drill four 19/64" dia. holes on 2" B.C.
5th T. F. — Ream four 5/16" dia. holes on 2" B.C.

*Adds up to 14 operations

**Note** that even the *drilling* is done on the P&J Turret Lathe — a tremendous time and trouble saver.



## Do it on the P&J 3U SPEED-FLEX

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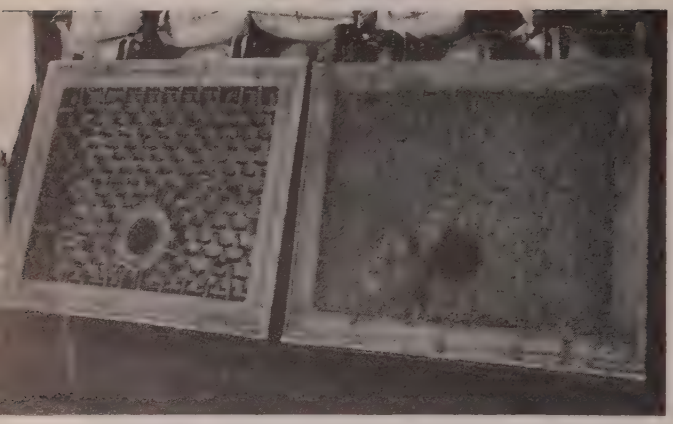


*Fig. 2—Water cooled open hearth door, before and after tamping in chrome mix*

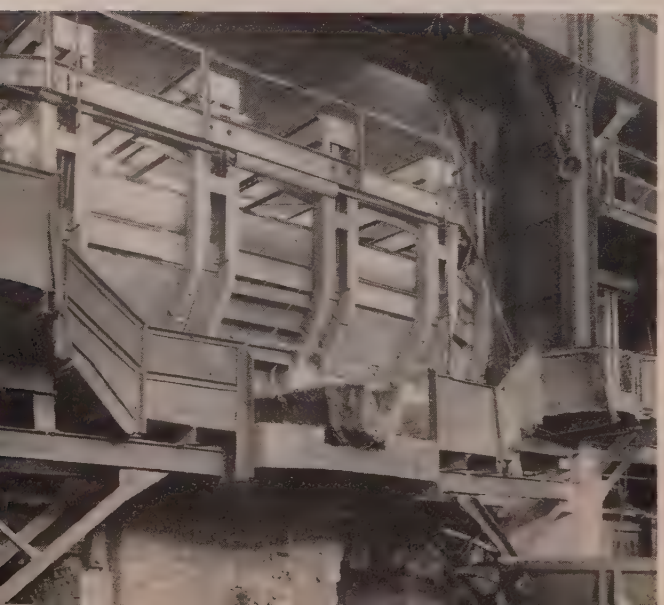
nages of commodity steels so necessary for development of this great land of ours, because of scarcity of large power plants, lack of electric power distribution systems, and high cost of power. The successful control of great surges of current had not been perfected in those days.

The bessemer process had been developed in England and the United States independently during the Civil War years. At a time when little scrap iron was available, and less known about its use, the acid bessemer process was developed to a high degree of efficiency in the United States.

Our great national railroad building program, following the Civil War, could not have been accomplished so rapidly without the thousands of tons of bessemer rails made during those years. Bessemer steel made the "winning of the west" an accomplished fact.

Nevertheless, the process had many short-comings—low phosphorous iron ores, which had to be used,

*Fig. 3—Rear view of open hearth furnace showing construction of sloping back-wall, tapping spout and back-standing*



were not plentiful. Phosphorus, a detrimental element in medium and high carbon steels, could not be removed by this process. Sulphur content of the steel depended on the sulphur in the "hot metal" used in the bessemer operation. Industrialists continued to search for a process which could make use of cheaper raw materials, and which would be more flexible in control of the analysis of steel produced.

Steel producers had a choice of two other processes, namely, the acid and basic open hearth processes.

The first open hearth furnaces built in the 1860's were small 5-ton furnaces—having silica sand hearths—a far cry from the 200 to 225-ton giants of today.

One of the first successful furnaces of this capacity was built and successfully operated by John Galvin, a well-known American steelmaker, at the Bay State Iron Works, South Boston, Mass.

In the campaigns (operation from one repair to the next) on this furnace, it was first dried out for several weeks with wood fires, before producer gas (made from coal) was introduced into the furnace. (There was constant fear of explosions, not unwarranted, in the early use of such fuel.) Silica sand was then shoveled into the furnace, heated as hot as possible, and beaten with steel rods to make the bottom solid. Another batch of sand was added and the process was repeated until the hearth was completed. This process was slow and costly. Scrap iron and pig iron after having been heated "red hot" in another furnace, was charged by means of a long-handled steel paddle into the open hearth furnace. Scrap iron and pig iron analyses were unknown as this was before the day of the chemist. Carbon was "poled" out by stirring rods or saplings through the molten metal which operation brought the slag and metal in more intimate contact and thus speeded up furnace reactions.

In the acid open hearth process pig iron and scrap iron could be used. It was not dependent for its heat upon the temperature generated by oxidation of the impurities in their elimination from the metal bath, as in the bessemer converter.

Operation of the acid furnace was under somewhat greater control than was the case in the bessemer process. Samples could be taken at frequent intervals for both physical and chemical tests. There was less danger of over-oxidation. The product was more reliable than that produced in the bessemer converter. Yield of ingots was much greater. With exception of the bottom lining, basic and acid open hearth furnaces are practically identical.

Heats made by the acid process are tapped after a test from the furnace has been cooled and broken into two pieces to observe the fracture. It may then be sent to the laboratory for analysis. There is no control of sulphur and phosphorous; however, manganese can be controlled by suitable additions, and silicon and carbon can be removed. This process has, however, no particular advantage over the bessemer process.

The acid open hearth process has never become of great importance in the United States, due to a lack of flexibility in control of sulphur and phosphorous. It has, however, served a useful purpose in the manufacture of foundry steels to produce sound castings.

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**LEBANON** *ALLOY AND STEEL* Castings

The first successful basic open hearth furnace was built at the Otis Steel Co. plant in Cleveland in 1886. It had a capacity of about 15 tons.

Real impetus to basic open hearth furnace steel production came when, in 1888, 50-ton basic open hearth furnaces started to operate at the Homestead Steel Works, Munhall, Pa., near Pittsburgh. Hydraulic power and lifts were used in this new venture.

Fifty-ton tilting open hearth furnaces were built in Steelton, Pa. in 1890. Tilting furnaces, however, though very important to a few companies, never became very popular with the industry mainly because of high fuel and maintenance costs. In recent years many large tilting furnaces have been changed over to stationary furnaces.

In 1880 open hearth production, mostly acid steel, was 100,000 gross tons. Bessemer steel production was 1,075,000 gross tons in the same year.

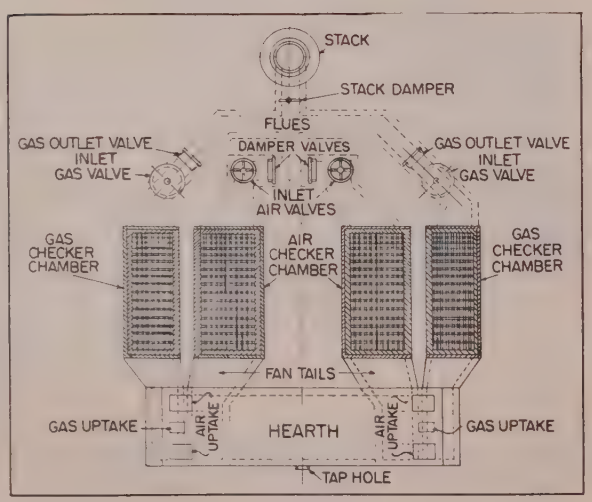
By 1900 open hearth tonnage, now mostly basic steel, had increased to 3,400,000 gross tons, and bessemer steel to 6,700,000 gross tons. In 1910, both processes were even in the race for consumer preference.

By 1920 open hearth production had made a great spurt to 32,700,000 gross tons and bessemer steel production had dropped to 5,000,000 gross tons.

By 1940 open hearth tonnage had reached 61,573,083 gross tons and bessemer tonnage—now mostly a mere appendage to certain large ingot tonnage producers—could only muster a total of 3,708,573 gross tons.

During and following World War II, the extreme scarcity and high price of scrap iron influenced some steel companies having excess hot metal capacity to use their bessemer capacity directly in ingot manufacture.

In other cases, molten iron from the blast furnace is partially refined by reduction of silicon, manganese and carbon in the bessemer converter and then the partially refined metal is transferred to large open hearth furnaces for finishing and final refining of the charge. This practice is known as the duplex process. Tons per hour in the open hearth furnaces are greatly increased, and fuel and raw material costs



Mr. L. F. Reinartz was born in East Liverpool, Ohio.

He graduated from East Liverpool high school—and from Carnegie Institute of Technology with a bachelor of science in metallurgy.

In 1923 Carnegie Institute of Technology gave Mr. Reinartz the professional degree of metallurgical engineer.

He started to work as a chemist at the American Rolling Mills (now Armco Steel Corporation)—Middletown, O., in 1909. Later assistant superintendent and superintendent of Open Hearth Dept. at Middletown. Then assistant general superintendent from 1923 to 1930—works manager, East works (Armco) 1930 to 1938—manager, Middletown-Hamilton Div. —1938 to date.

He is a charter member and has been chairman of National Open Hearth Conference for 20 years. Director and vice president of American Institute of Mining and Metallurgical Engineers—1943 to 1947. Member of executive committee of the National Open Hearth Conference and Iron & Steel Institute, American Management Association and U. S. Chamber of Commerce at the present time.

He is the author of many articles on iron and steel manufacture, and has been granted several iron and steel patents.

are greatly reduced. In postwar days, this duplex process was used to great advantage by several leading steel companies.

According to American Iron & Steel Institute records, at the present time there are in the United States 955 open hearth furnaces ranging from 10 to 250-ton capacity; 29 bessemer converters, and 217 electric furnaces. Of the total present day annual ingot capacity of 94,233,460 net tons of ingots and steel for castings, over 91,240,000 net tons come from open hearth furnaces.

In any effort to over-simplify the story of a complex operation, there is always the danger that the individual studying the progress of an art or science, such as steel manufacture, may not appreciate the tremendous strides made by the industry in converting small, crude, inefficient furnaces of the early days of the 20th century to the modern, high-powered furnaces which melt and refine charges of 200 tons or more in 11 to 12 hours or less.

Workers in steel plants, three to four decades ago, had dirty, hard, hot, man-killing jobs. Furnaces were inefficient, campaigns were short, brick work did not last long, fuel consumption was high, tons per hour low, delays were excessive and quality control practically unknown.

Engineers, metallurgists, chemists and operators, by careful, painstaking and often disappointing study of the process, its limitations and possibilities, slowly began to make improvements in construction; in quality and type of refractories used; in water cooling

*Fig. 4—General arrangement of natural draft producer gas fired furnace—90 gross ton*

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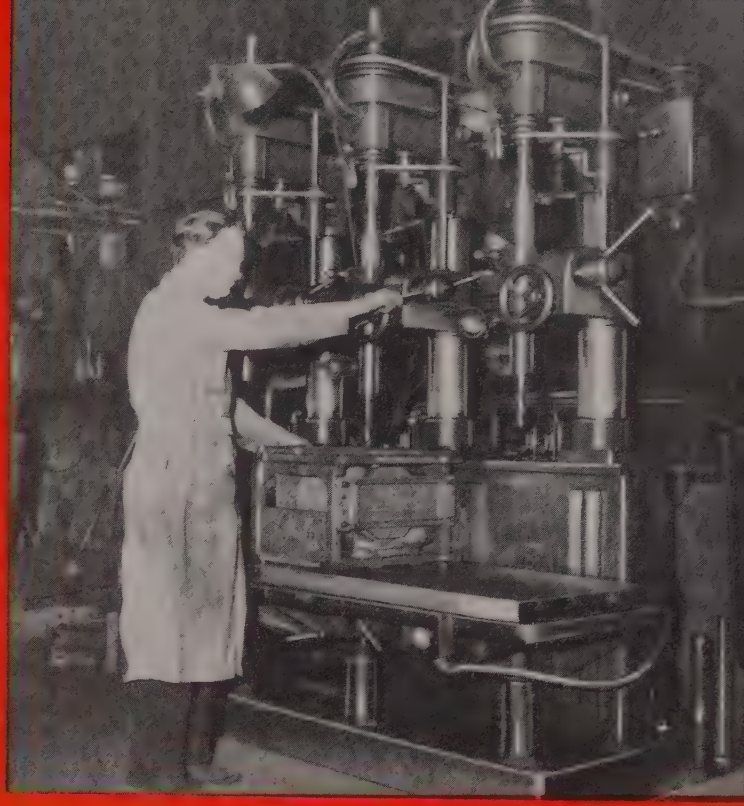

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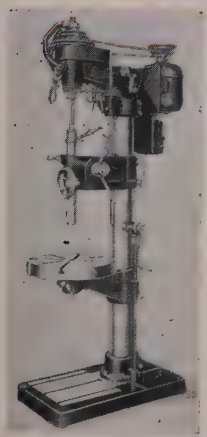

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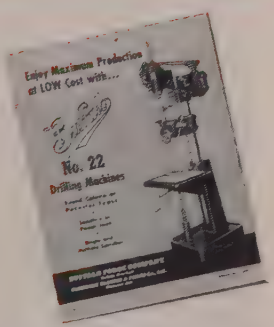


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essential parts; in much better fuel practice; in insulation of furnaces, and in the development of standard practices for quality control of steel. Advent of oxygen use in open hearth furnace maintenance and tap hole practice was a great boon to operators.

One must not ignore nor lose sight of the great progress made by the open hearth industry since the adoption of the 8-hour day. The 10-hour day and 13-hour night shifts, with the 24-hour swing shift at the end of the week, were man-killers. Higher type workers were attracted to the steel plant after such long shifts were abandoned.

During the last 20 years a radical change has taken place in the fuel used for manufacture of steel ingots in the United States. Prior to that time, most steel was made in furnaces using producer gas as a fuel. It had been used mainly because of the availability of coal and its cheap price. Producer gas, however, was apt to be irregular in analysis and heating values, and high in sulphur if sulphur content of the coal from which it was manufactured was high.

Therefore, when by-product plants making coke for blast furnaces came into almost universal use, the resulting coke oven gas began to be used in some open hearth furnaces as a fuel. In those years, also, natural gas and oil became most plentiful. These fuels were more adaptable to melting operation than producer gas, mainly because it was not necessary to preheat them. Existing furnaces could be enlarged without a major expenditure of money; control of sulphur in the steel was more positive; tons per hour of the furnaces were greatly increased, so that today relatively few open hearth furnaces still use producer gas as a fuel.

Use of fuels, which needed no preheat, simplified furnace construction problems by eliminating gas ports, which required elaborate water cooling, and by avoiding separate fuel and air uptakes requiring massive brick work to prevent interchange between fuel and air, with resultant premature combustion.

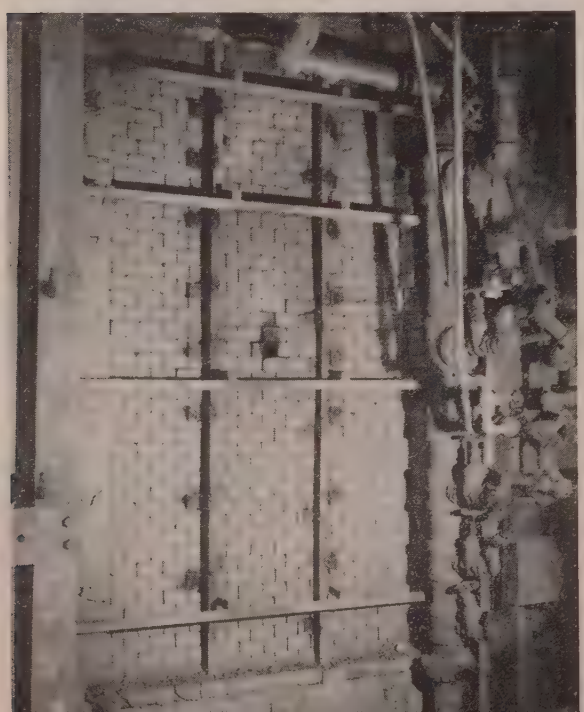

*Fig. 5—Chrome magnesite brick used in end wall construction. Water cooling pipes at right are for protection of fuel ports*

## The Fundamentals of Steelmaking

**This is Part I of the third of a series of 27 articles dealing with modern practice in every department of the iron and steel industry, extending from raw material to the finished products. Each article is written by a man whose outstanding ability and experience in his particular field entitles him to write with authority. While much of the subject matter is technical in character, it has been written and edited with the objective that the text can be easily understood by the layman. Previous articles in the series dealing with production of electric steel and preparation of scrap were written by Walter M. Farnsworth of Republic Steel Corp., and Edwin C. Barringer of the Institute of Scrap Iron and Steel, respectively.**

Today, installation of a modern open hearth plant consisting of 200 to 225-ton capacity furnaces, means the expenditure of approximately $2 million per furnace. This includes the furnace, auxiliaries, as well as stocking, teeming, and ingot handling facilities.

The modern trend is to build the stock-yard as an integral part of the furnace building to speed up bringing charges to the furnaces. In modern shops much attention has been given to efficient handling of raw materials such as dolomite, burnt refractories, brick, limestone, ore for furnace additions, scrap iron and pig iron or hot metal.

Because of the high cost of operating open hearth furnaces, it is essential to provide a sufficient number of efficient cranes, charging machines, charging pans and cars, ingot buggies and molds, as well as facilities for prompt preparation and cleaning of the same, magnets, conveyors, buckets, to speed up daily jobs.

In integrated steel plants it is important that hot metal arrival at the open hearth department be scheduled so as to be available at the proper time when required by the various open hearth furnaces. Much time can be saved or lost depending on the way such a schedule is operated. It means very close co-operation between blast furnace, open hearth management and operators.

Again pit practice must be standardized so that, when a charge of metal is ready to be tapped, ladles, spouts, cinder pots, and molds are all ready so no delay occurs in tapping the heat. The best steel in the world can be ruined by delays on the pit side of the furnace, or by carelessness in cleaning and preparing molds, as well as careless ladle preparation or teeming into molds.

More than half of the ingot producing basic open hearth furnaces in the United States now have capacities of 100 to 175 tons per heat. The most modern furnaces have capacities of 200 to 225 tons.

Engineers no longer use the tie rod construction, as in former years, to hold the furnace roof. They depend entirely on a rigid steel structure to house the

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*Unretouched photographs of the sluices in the McNally-Pittsburg Coal Washer at the Maiden Mine, Maidsville, W. Va. (Above) Sluices filled with fast-moving coal and water. (Right) Water flows over the exposed JALLOY plates.*

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furnace from the bottom of slag pockets to the furnace proper. Main buckstays of a furnace hearth often are made of very heavy slabs. Some plants use 6 x 15-inch steel slabs in the front and 6 x 12-inch bent buckstays in the rear construction. Modern furnaces no longer have central concrete pillars under the furnace proper but 24-inch steel I-beams are placed longitudinally on massive concrete bases at each end of the furnace on 18 to 24-inch centers. On top of these beams 15-inch steel I-beams are placed crosswise on 18 to 24-inch centers. Bottom plates of the hearth are placed on top of these beams. These plates, usually ¾ to 1-inch thick, are riveted together and often welded for extra strength and form a pan shaped hearth. At each end of the furnace hearth a chill box of heavy plate construction is placed to help keep furnace hearth ends cool, by allowing air to pass between the end of the hearth pan and the furnace ends. Hearths vary in length from about

*Fig. 6—Entrance into fan tails to checker chambers and suspended basic brick arch above fan tails*

22 to 52 feet and in width from 9 to 18 feet, depending on capacity of the furnaces.

Modern furnaces are equipped with five charging doors, large enough to accommodate 20 to 40 cubic feet capacity charging pans. Each water-cooled steel door, which is usually lined with a chrome mix compound, slides on a water-cooled steel door frame. Skewback channels for holding skewback brick for the roof arch are usually made of cast steel and are water cooled. (See Fig. 1)

The fore plate under the door is usually about 70 to 80 inches above the steel bottom plate and from 20 to 45 inches above the bottom of the furnace refractory hearth, depending on the size of the furnace and type of charge. Bottom of the skewback channel is from 4 feet 6 inches to 5 feet 6 inches above the fore plate.

Actual capacity of the furnace depends on the judgment of supervisors of the open hearth department and furnace crews. If a heat of steel, when melted, lies above the fore plate level, as it often does, great care must be exercised not to break the refractory bank, or "break-outs" of slag and metal (which may be costly) will result. In some plants a steel bar is placed across the door opening to help support the refractory bank and thus prevent break-outs.

In modern furnaces from 2½ to 4 inches of insulating cement or brick is placed directly on the steel bottom plate. Several courses of first quality fire clay brick are placed on top of this insulation. These brick are built up on the front and back as well as the ends to form a hearth. From 2 to 4 courses of chrome or magnesite brick or chromag brick are placed on top of the fire clay brick. (See Fig. 1)

The practice of installing bottoms from this point varies with the ideas and experience of operators.

In some plants chrome ore is packed into the corners, and several inches sintered on the bottom. Chrome ore, a sesqui-oxide of chromium, is practically neutral. A typical analysis is chrome oxide 38 to 40 per cent; alumina about 24.5 per cent; iron peroxide 17.5 per cent; silica 3.25 per cent; and magnesia 15 per cent. On top of this chrome ore, a thin layer of burnt magnesite—with the fines screened out, and with an addition of 10 to 20 per cent ground open hearth slag, thoroughly mixed dry with the magnesite in a concrete mixer— is shoveled all over the bottom, as well as ends and sides in small batches. Each of these batches is thoroughly sintered by running the furnace at as high a temperature as possible for 3 to 4 hours. This process is continued until desired thickness of bottom is reached. Such bottoms require a week or more to build. The furnace is cooled until the bottom cracks and then reheated, and when up to temperature, a charge of basic open hearth slag is melted in the hearth to fill all voids. After this slag is splashed over the banks, it is tapped out and the furnace is chilled. After reheating, it is ready for its first charge. In other plants, where there is a desire to speed up bottom building and save time, burnt magnesite is mixed with a binder, such as tar, and rammed to a depth of 15 to 20 inches on top of the chrome magnesite brick. This mixture is burnt in at a high temperature until the material is thoroughly set. A typical analysis of burnt magnesite is as follows: Silica 2.8 per cent; alumina 0.93 per cent; iron oxide 8.57 per cent; lime 1.1 per cent; magnesia 85.3 per cent; and carbon dioxide 0.57 per cent.

**OPEN HEARTH FURNACES IN THE UNITED STATES**

**January 1, 1948**

| Rated Capacity Per Heat (net tons) | Basic Stationary | Basic Tilting | Total Basic Furnaces | Acid Stationary | Acid Tilting | Total Acid Furnaces | Total Both Groups |
|---|---|---|---|---|---|---|---|
| 11–30 | 9 | 3 | 12 | 9 | 2 | 11 | 23 |
| 31–50 | 30 | .. | 30 | 13 | . | 13 | 43 |
| 51–70 | 56 | 1 | 57 | 8 | 4 | 12 | 69 |
| 71–90 | 75 | .. | 75 | 6 | . | 6 | 81 |
| 91–110 | 114 | .. | 114 | 3 | . | 3 | 117 |
| 111–130 | 219 | .. | 219 | 1 | . | 1 | 220 |
| 131–150 | 139 | 13 | 152 | .. | . | .. | 152 |
| 151–170 | 83 | 5 | 88 | .. | . | .. | 88 |
| 171–190 | 61 | 7 | 68 | .. | . | .. | 68 |
| 191–210 | 31 | 7 | 38 | .. | . | .. | 38 |
| 211–230 | 39 | 10 | 49 | .. | . | .. | 49 |
| 231–280 | 1 | .. | 1 | .. | . | .. | 1 |
| 281–330 | ... | .. | ... | .. | . | .. | ... |
| 331–380 | 55 | .. | 5 | .. | . | .. | 5 |
| 381–400 | 1 | .. | 1 | .. | . | .. | 1 |
| Total | 863 | 46 | 909 | 40 | 6 | 46 | 955 |

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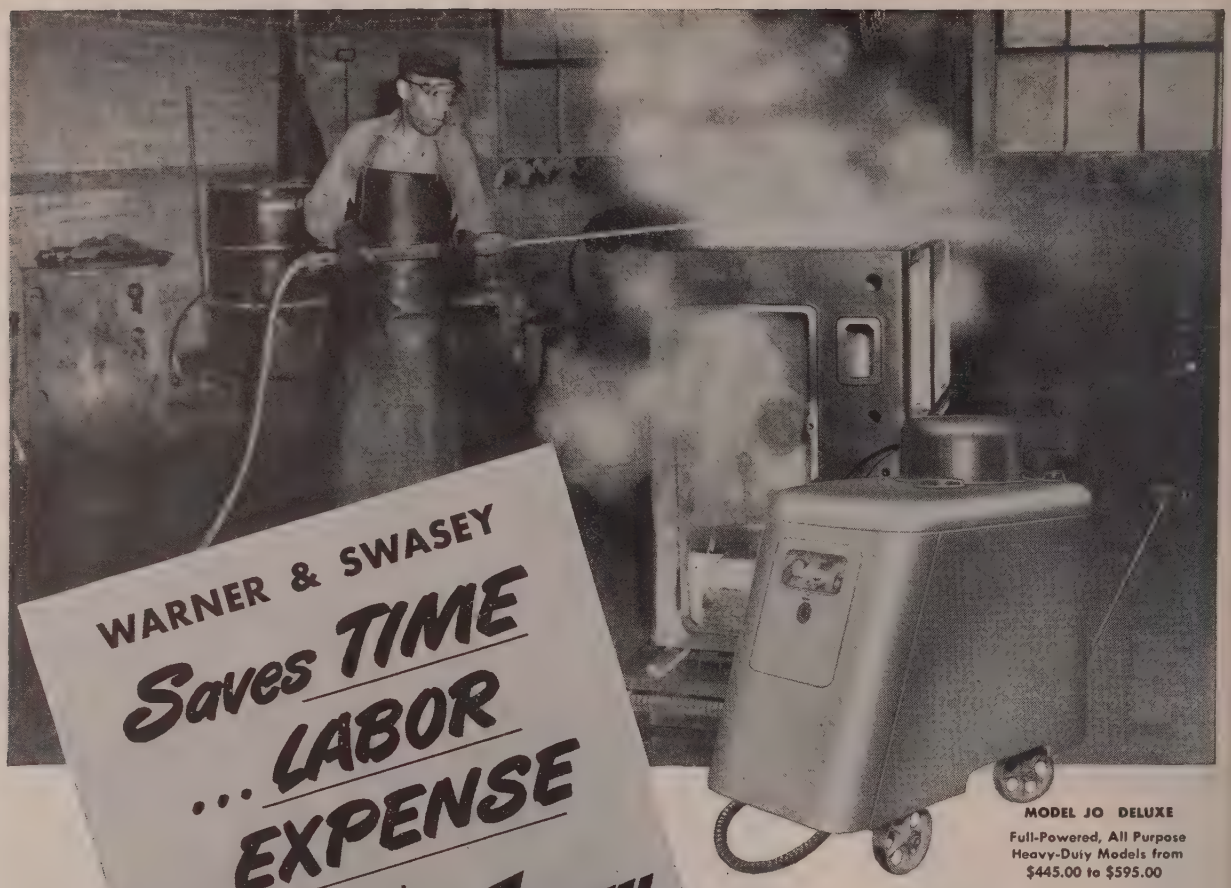

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Some plants compromise by ramming in part of the hearth and sintering from 6 to 12 inches of burnt magnesite on top of the rammed bottom. Such practice has given very good results. Secret of future quality and high tons per hour in subsequent furnace campaigns lies on obtaining a dense, slag resisting, impervious hearth. Because such a bottom may have to operate for many years, quality-minded steel men still prefer to take time to sinter in a bottom.

In maintenance of such a bottom, after a heat has been tapped, care should be taken to drain out steel from low spots by cutting down any ridge formed in front of the tap hole. Air or oxygen blown through a 1¼-inch steel pipe may be used for such a purpose. In some plants long rods with steel or wooden paddles at the ends may be used to rabble out holes. Great care must be exercised in filling up the low spots (with burnt refractories) after such an operation. If the hole is very deep, time must be taken to rabble or clean all steel out of the hole, and then set the bottom with magnesite or other refractory. It pays not to rush such an operation.

When building bottom in an acid open hearth furnace, a thin layer of sandstone or granite chips is spread over the silica brick hearth. The furnace is then heated until the chips begin to soften. After that a thin layer of sand is spread over these chips and heated until the coating is glazed. This operation is repeated until a bottom of desired depth is obtained. The hearth is extended up the side walls at least a foot above the slag line. A "wash-heat", consisting of a charge of acid open hearth slag, is melted as a preliminary to the first heat. Furnace banks are thoroughly washed down with this slag by the use of rabbles, as in the basic practice.

Tap hole construction and maintenance of same are most essential to good practice. An opening about 15 by 20 inches is built with magnesite brick through the back bank of the hearth and arched over with the same kind of magnesite brick. A 6-inch pipe about 4 feet long is inserted in this opening, and plastic chrome ore or magnesite is packed around it from the rear of the furnace, and chrome ore is also shoveled in through the front—middle door. The tap hole must have a good slope from the bottom of the hearth inside of the furnace to the tapping spout in order to provide proper drainage from the furnace bottom. Before starting to charge a furnace, the tap hole pipe is filled with burnt dolomite. It is faced on the inside of the furnace with a mixture of dolomite and burnt refractory. In the rear of the furnace a mixture of burnt dolomite and raw dolomite is tamped into the hole to facilitate opening the tap hole at tapping time. A plug of clay loam completes the sealing of the tap hole in the rear of the furnace.

Throughout the furnace campaign, great care must be exercised to clean slag and metal out of the tap hole after each heat has been tapped—otherwise "hard" taps with resultant delay and ruined quality of steel may result on the next heat. If the hole becomes too small it must be burnt out with oxygen. If it becomes too large, it must be built up with plastic chrome ore, or the hole may have to be piped as in the original start of the furnace.

In acid practice, the tap hole—15 to 20 inches square—is arched over with silica brick and extends from outside into the hearth. This hole is closed with a tapered wood plug around which gannister (ground sandstone) is rammed. The plug is then removed. The hole is filled with anthracite coal from the charging side of the furnace and is closed on the outside by ramming a clay loam plug into place. The tap hole sinters when the furnace is heated up.

Front walls of most modern furnaces consist of 18 inches of chrome brick, which taper off to 13½-inch brick at the skewback channel. The brick work is frequently anchored to the steel binding by sheet steel separators inserted every 4 or 5 courses, and projected beyond its brickwork for fastening to the buckstays. Such walls may last from 100 heats to the life of the roof depending on fuel, grades of steel made, and skill of operators.

Most back walls are of the sloping design with angles of about 45 degrees from horizontal. Some plants use a fire brick facing against castings or plates which are attached to the bent buckstays in the back wall. (See Fig. 3) On top of these brick, chrome brick are placed. The entire back wall is faced with plastic chrome ore several inches thick. In other plants the entire back wall is laid up with chrome brick and faced with plastic chrome ore.

Roof practice varies in different plants. In large modern furnaces, the tendency is to use 18-inch silica brick in the front and back part of the roof for a distance of 3 feet or more in from the skewback brick, with a lighter 13½-inch section in the middle of the roof. To strengthen the roof, silica rib brick from 6 to 9 inches wide and 24 inches long are inserted across the furnace approximately every 27 inches—center to center.

*Fig. 7—Short venturi stacks replacing high natural draft stacks*

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# 'EAR IN METALWORKING

● To a hundred thousand metalworking executives, these fifty-two issues of STEEL were a weekly information service that added up to a complete record of the industry. Carrying significant news as it happened, up-to-date market reports, authoritative technical articles and engineering data, STEEL provided these top executives with information they needed to improve production, reduce costs and increase their business. The important year ahead will be covered just as thoroughly for these readers of STEEL, and for the thousands of metalworking men who will join the growing number of STEEL readers during the coming weeks.

Rise of the roof arch also varies—but 24 inches would appear to be most common in large furnaces. Lengthwise practice also varies depending on size of the furnace and fuel used. Most furnaces, burning oil, tar or a mixture of liquid and gaseous fuels, have a straight section from end to end over most of the bath. A sloping section, known as the "knuckle", dips down about 6 to 8 feet to a flat section of about 3 feet over the hearth end, then the port roof slopes from this point to the furnace port end—a distance of 15 to 20 feet.

Roof life varies again from 150 to 300 or more heats depending on furnace size; efficiency of combustion; grades of steel made; brick work delays; and, to some extent, on quality of silica brick used.

Experiments with use of suspended basic brick roofs are being carried on in two steel plants at the present time in an all-basic furnace design with some prospects of success. Such roofs are very heavy and require extra strong steel work to prevent structural steel failure. It will be necessary to lengthen roof life considerably to pay for the decided increase in brick cost.

Port construction varies over a wide variety of designs depending on the operators' ideas and kinds of fuel used. Successful furnace operation depends, in a great measure, on proper port construction of an open hearth furnace, which are the openings through which gas and air are admitted. Ports, alternately, are subjected to the rush of outgoing incandescent high temperature gases laden with particles of iron ore, limestone, slag, and other fumes. Although properly constructed as to size and alignment, it is difficult to keep them in the condition as originally designed and built. (See Fig. 4)

Ports of an open hearth furnace are located so that the air, being heavier, enters above and outside the producer gas or other fuel. The two—air and gas—then are deflected downward by the port alignment. Air and gas spread and mingle where the port meets the furnace hearth and combustion takes place at that point when the flame sweeps over the entire bath.

The air, being above the gas, has a tendency to protect the roof from the intense heat generated. On the other hand the gas being underneath protects the charge from undue oxidation. The best place for gas and air to meet is at the port ends—3 to 5 feet above the bath of metal. Therefore, the gas and air ports together with the down or up takes (depending whether on outgoing or incoming end) merely form a gas burner on a very large scale.

When liquid or part liquid and gaseous fuels are used, the modern tendency has been to avoid too much constriction at the knuckles. Chrome brick wing walls are built into the ports to help direct the air from the uptakes or port ends into the gas stream where both enter the laboratory of the furnace hearth. If cooling water is of such quality that water-cooled oil or gas burners can be used, they are inserted through an opening in the middle of the end wall and across a single uptake. In other cases, a chrome brick or silica brick arched wall faced with chrome brick divides the uptake into two openings from the single slag pockets. The burner—usually a long pipe —extends through a port block opening a distance of about 11 feet to a water-cooled tank surrounded by chrome brick which protects the burner tip. In some plants essential parts of the inner port heels are protected by water-cooled pipe.

Incidentally, modern open hearth furnaces use as high as one million gallons of cooling water per furnace each 24 hours. Where cold, clean lake or river water is available, after filtering, it may be pumped directly into the open hearth system and then to the sewer. In parts of the country where water is hard, it must be treated to remove harmful salts, and recirculated to reduce the cost of such treatment.

End walls of furnaces may be built of all silica brick, silica brick faced on the inside with chrome brick, all chrome brick or all metal cased magnesite brick. (See Fig. 5) In the latter two cases, they will usually, with a little patching, last the entire length of the furnace campaign.

Most open hearth furnaces still have silica brick uptakes and slag pockets, with exception of the lower

*Fig. 8—Slag pocket of basic end furnace showing part of suspended uptake construction*

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five feet of the slag pockets which are built of first quality clay brick. In most furnaces, in slag pockets, temporary side walls are laid up with fire clay brick bats on a false bottom covered with sand, to expedite removal of slag. A slot under the bottom of the slag pocket is often provided, when the bottom is at pit level, for insertion of a heavy steel beam, which is used as a lever to break up slag accumulations during furnace repairs.

In a number of plants, an all-basic end, uptake and slag pocket construction has been adopted. Chrome magnesite, metal cased brick, having about 70 per cent magnesite, are used in such design. Slag pockets are approximately 15 to 18 feet. They are designed to slow down furnace gases on the way to checker chambers so they will drop entrained solids in the slag pockets. A suspended brick construction is used on the slope from the slag pockets up to the uptakes and also at the entrance to the fan tails. Slag pockets are usually insulated with 13½-inch basic brick laid up with ¼-inch steel plates—laid horizontally between every fourth course—and anchored to the furnace structural steel. Slag pocket bulkheads are built of first-quality fire clay brick.

Such basic ends have already lasted more than 2000 heats. They can readily be patched, thus saving considerable repair time. The deposit in the slag pockets, containing no silica, is almost pure iron oxide. It is crumbly and granular, and can usually be shoveled from the pockets, thus speeding up repairs. It can be charged into the open hearth furnace as a replacement for sinter.

Passage ways from the two slag pockets to the checkers are known as fan-tails. Every effort is made to build them as large as possible and to permit furnace gases from the slag pockets to enter the checker chamber at as small an angle and as low speed as possible.

To avoid slag running or being carried into the checker chambers, floor of the fan-tail, where it meets the slag pocket, is usually at least 5 to 6 feet above the floor of the slag pocket. Where the fan-tail meets the checker chamber the floor may be 2 to 3 feet higher. Fan-tail side walls and roof are built with silica brick. Where construction has permitted, fan-tail roofs and checker chamber roofs in new furnaces are flat and suspended. In some older furnaces, changes have been made to adopt this design. Most plants still use the sprung arch on fan tails and checker chamber roofs. (See Figs. 6 and 8)

Although, with liquid and gaseous high calorific fuels, only one checker chamber at each end of the furnace is needed. Most operators still use conventional gas and air checkers at each end of the furnace—only now both chambers are used to preheat the air. If suspended roofs are used, they may be extended over both checkers.

Checker chambers vary in size. They may be 18 to 28 feet high; 20 to 30 feet long; and width may vary from 7 to 10 feet in the gas chambers and 10 to 16 feet in the air chambers. In the chambers checkers are usually built up to about 3 to 4 feet from the skewback of the checker chamber roofs. Gas and air chambers or regenerators formerly were located directly underneath the furnace. This arrangement, old timers say, insured more rapid working of the heat but repairs were more difficult to make. In case of a metal "break" through the ends of the furnace, a long, costly delay resulted.

Exact proportions of the checker chambers—gas and air—are not so important, however, they should be of ample size. Ratio of gas to air chamber volumes is about 1 to 1-1/3 inches in modern furnaces. Checker chamber walls are usually constructed of 13½ to 18-

*Fig. 9—Cellar of open hearth department showing lighting, housekeeping, venturi stack motors for Isley fans for furnace control. Note absence of valves*

inch fire clay brick backed by 4½ inches of insulating brick or cement. In some instances the entire outside checker chamber area is covered with ¼-inch steel plates. Many types of checker brick have been used from time to time. While a large heating surface is desirable in checker work, this must not be overdone by reducing openings between the brick. If these openings are unduly reduced, flue dust from furnace gases will clog up the openings rapidly.

Quite a number of plants have had satisfactory service from the 3 x 4 x 10½-inch first quality checker brick with a 6 x 6 inch opening. Such brick have higher salvage value than special shapes, and they can be more readily cleaned. Some plants have gone to 7½ x 7½-inch straight flues. With longer furnace hearths, basic ends and large slag pockets, as well as the use of liquid fuels, under proper control, conditions in the checker chambers have improved. Less slag and dust have been carried over into the checkers with longer campaigns and more tons as the result.

Modern practice demands a large area for rider walls beneath the checkers—a number of arched walls 3½ to 5 feet high support the checker work. Space between these walls permits ample area for accumulation of checker dust blown down from checkers once every two months by means of compressed air, steam, or high pressure water lances inserted through holes in the checker chamber doors in the rear of the chambers.

Built in the floor of some checker chambers, as well as in flues to the valves and stacks, soot blowers, which are operated by high pressure steam, are very helpful in keeping soot or flue dust blown out of these areas and thus help prolong a furnace campaign.

Open hearth furnace valves have been sources of great loss of tonnage in the past due to leakage, loss of draft because of right angle bends, high maintenance cost due to warpage and poor design. For reversing the flow of preheated air to the furnace and drawing fresh air from the outside, modern furnaces are almost universally equipped in the flues to the stack with straight-line—water cooled or alloy—sliding steel damper valves with water-cooled seats, set at a slight angle in the flue from top to bottom in order to facilitate an air-tight seal. Modern stacks may be of all-brick construction or brick-lined self-supporting steel stacks from 150 to 175 feet high. They are usually 6 to 7 feet in diameter. A water-cooled vertical damper, controlled by the furnace operator, regulates effect of the stack draft.

In some plants, when it is desirable to produce steam for fuel oil burning and other purposes, horizontal fire tube waste heat boilers are used in the waste gas system. As high as 1100 pounds of steam per ton may be obtained from a modern furnace. Draft is provided for the furnace by powerful fans in this system. Spent gases are exhausted to the stack from the boiler.

In certain modern designs, valves have been eliminated, and good economy in fuel obtained when using liquid or gaseous fuel, by installation of two venturi stacks about 60 feet high, one at each end of the furnace. (See Fig. 7) A large fan driven by a variable

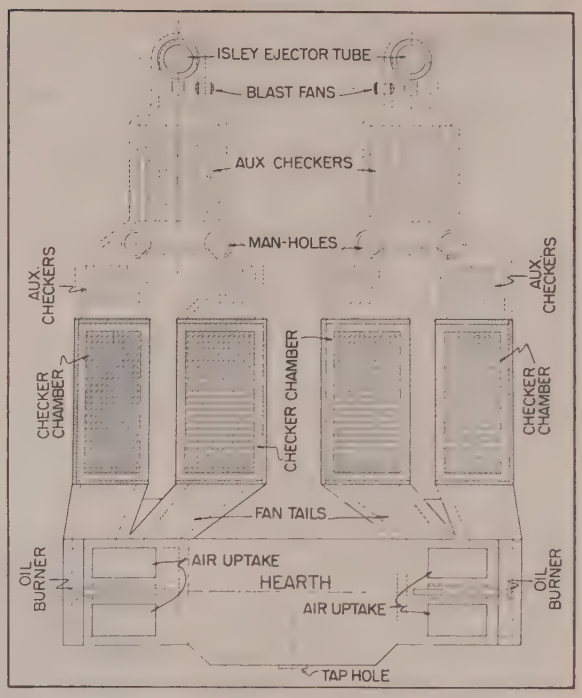



*Fig. 10—General arrangement of oil fired furnace —Isley control*

speed 100 horsepower motor is connected from the outside with each such stack near the bottom. By merely changing speed of the fan and moving a slide damper in the throat of each venturi stack, air can be forced into the furnace under proper control and waste gases can be exhausted from the system at the furnace exit end. Reversals, thus, are made by merely changing the speed of each motor and opening or closing the slide damper on the venturi stack. (See Fig. 9) There is a minimum of leakage in this system. Reversals can be made rapidly, tons per hour have increased, and fuel economy has been outstanding. In this design, auxiliary checker area is available, if needed, in the space formerly occupied by the reversing valves. (See Fig. 10).

One of the greatest advances made in recent years has been the general adoption of brick work insulation in open hearth furnaces. After many trials, furnaces almost universally are insulated from above the charging floor, down the ends and slag pockets, side walls of fan tails, roofs, side walls, and ends of checker chambers, and flues to stack. Such insulation has prevented a great deal of air infiltration and escape of valuable heat through the brick work. So far, insulation of open hearth furnace roofs, though tried many times, in most instances, has been proved to be uneconomical.

Success in the efficient use of insulation depends on furnace construction, skill of operators, efficiency of combustion control, and amount and type of insulation used, as well as skill in the application of insulation.

Savings of from 5 to 7 per cent in fuel consumption can easily be made by proper insulation practice.

(*To be continued*)

# Applying Titanium Enamel—*Concluded from Page 65*

screen is used in the rotospray. After the new enamel is added to the barrel it is all thoroughly stirred with a rubber-bladed paddle. The enamel is "set-up" for spraying by two tests.

Specific gravity is adjusted to 1.74 to 1.75. Next a slump test is made. A slump of 8½-inches is used. Any adjustment to this 8½-inch requirement is made by decreasing the specific gravity to the bottom limit. It is a rare case when we do not have enough "set", in which case it is increased with sodium nitrite.

Reclaimed titanium enamel is used on the backs of the titanium steel ware. The dry reclaim is collected and reprocessed with great care to avoid contamination with zirconium enamels. The dry reclaim is blunged with water for about 2 hours. The blunged enamel adjusted to a specific gravity of 1.75-1.76 is screened through a 10-mesh screen into a 60-gallon spray barrel. By means of air pressure the enamel is lifted up to and fed into a rotospray. From the rotospray the enamel passes through a magnetic separator, draining into a pump sump. The pump lifts the enamel directly into the reclaim mill.

The reclaim is milled with the least possible mill additions, so as not to change the acid resistance.

The reclaim mill addition is:

| | |
|---|---|
| Blunged and rotosprayed reclaim | 100 parts |
| Potassium carbonate | 1/16% |
| Sodium nitrite | 1/16% |
| Pink oxide | 0.00785% |
| Methyl violet dye | 0.125 grams |
| Urea* | ⅜% |

* Added after milling.

The reclaim is milled for 2 hours in a mill which is double charged so that the fineness is not affected. After the prescribed grinding, the reclaim is checked just like new titanium. Reclaim titanium enamel is prepared and set up for spraying like new titanium except that there is no further addition of urea.

Each standard set up for milling and preparing for use has a basis. Fineness is brought down to 0.6 per cent to get fastest possible softening of the enamel in the fire. Fineness is held at 0.4 per cent so as to have a control on the firing. The 1.74-1.75 specific gravity and 8½-inch slump is maintained to hold spray roughness to a minimum. The color check is made because of the tendency of titanium enamels to be yellow. The A R test is made because with our operating conditions a small decrease in acid resistance would throw us outside of the limit.

Cleanliness tests are just good mill-room practice. Addition of the sodium nitrite after milling permits us to remove sufficient enamel that the mill need not be rinsed to the floor. Urea addition is made to prevent tearing, and is made just before using as it loses its effect upon aging. Rerotospraying is done because on aging, the barrel return has a tendency to pit.

Following these standards and practices we are able to process ware without using a ground coat.

**TABLE III**

**OPERATION CONTROL CHART**

| Tank Number | Solution | Charge | Strength | Temp. ° F. |
|---|---|---|---|---|
| 1 | Emulsion Type Cleaner | 2100# | 2.9-3.4% $Na_2O$ | 210 |
| 2 | Hot Rinse | | | 100-120 |
| 3 | Saponification Type Cleaner | 1600# | 2.0-2.5% $Na_2O$ | 210 |
| 4 | Hot Rinse | | | 100-120 |
| 5 | Cold Rinse | | | |
| 6 | Acid | 14 Carboys 66° Be $H_2SO_4$ | 4.0-5.0% $H_2SO_4$ | 150†† |
| 7 | Acid | 15 Carboys | 4.0-5.0% $H_2SO_4$ | 150†† |
| 8 | Cold Rinse | ½ Gallon 66° Be $H_2SO_4$ | 3.0-3.5 pH | |
| 9 | Nickel† | 600# Single Nickel Salts & $NiSO_4.7H_2O$ 1½ Gallon 66° Be $H_2SO_4$ | 1.3-1.5 oz/gal 3.2-3.5 pH* | 170†† |
| 10 | Acid | 3 Gallons 66° Be $H_2SO_4$ | 0.15-0.20% $H_2SO_4$ | 90 |
| 11 | Neutralizer | 125# Flake Caustic 125# Sodium Cyanide | 0.2-0.4 oz/gal NaOH 0.28-0.56 oz/gal NaCN | 130-140 |
| 12 | Neutralizer | 50# Powdered Borax | 0.05-0.08% $Na_2O$ | 130-140 |

* Decreased with 4% $H_2SO_4$ or increased with Flake Caustic.
† Required nickel deposit is 0.080-0.120 Grams per square foot of surface, in a perfectly clear solution.
†† Automatic Temperature Control.

**TABLE IV**

**FREQUENCY OF PICKLE TESTS CHART**

| Tank Number | Solution | Frequency of control checks |
|---|---|---|
| 1 | Cleaner | Every 3 hours—A/T Weekly |
| 2 | Hot Rinse | Every 3 hours |
| 3 | Cleaner | Every 3 hours—A/T Weekly |
| 4 | Hot Rinse | Every 3 hours |
| 5 | Cold Rinse | |
| 6 | Acid | Every 3 hours—$FeSO_4$ . —$H_2O$ Weekly |
| 7 | Acid | Every 3 hours—$FeSO_4$ . —$H_2O$ Weekly |
| 8 | Cold Rinse | Every 3 hours |
| 9 | Nickel | Every 3 hours for temperature<br>Twice daily for pH, strength and nickel deposition |
| 10 | Acid | Daily for strength and pH |
| 11 | Neutralizer | Every 3 hours for temperature<br>Daily for strength |
| 12 | Neutralizer | Every 3 hours for temperature<br>Daily for strength |
| Over-all | | Torsion Trials Daily |

## Five-Day Schools Teach Battery Use and Care

Better techniques of storage battery maintenance and repair are being taught to foremen, supervisors and engineers in those industries which use lead-acid batteries for motive power, standby or direct current supply by the Gould Storage Battery Corp., Trenton, N. J. First of a series of the 5-day schools was held in November, nine lectures, actual work, demonstrations and oral and written examinations being part of the course.

Future courses will be conducted for battery powered lift trucks and material handling systems, telephone and other communications systems, railway car lighting, diesel starting and air conditioning and transportation signal work. Coal, metal and other material mining courses also will be held. The next course is expected to start in February. It probably will be organized to help industrial truck users specifically.

—o—

"It Must Be Somewhere" is the title of a new color motion picture which dramatizes the importance of accurate filing. Released by the Systems Division of Remington Rand Inc., New York, the sound film is 28 minutes long and portrays the contrast between an old, poorly lighted, badly located and crowded file room and the airy, streamlined efficiency of a scientifically laid-out and correctly operated filing department.

## Gear Checking Fixture

Model 471-A universal Sine-Line checking fixture, designed by Michigan Tool Co., 7171 East McNichols Rd., Detroit 12, Mich., is for checking gears, gear blanks, hobs, worms, worm blanks, milling cutters and form tools up to 10 inches outside di-

ameter and 8 inches maximum face width. With the various indicator assemblies available with it, the fixture can be used to accurately check tooth spacing, pitch radius, concentricity and taper of spur and helical gears, plus parallelism and crowning of spur gears.

All of the indicator assemblies may be used with the AY-1 automatic checking recorder where a permanent record is desirable. Carboloy tipped cones are furnished for the cone check. Indicators on the two standard and two special assemblies have 0.0005-inch graduations, while the other special indicator assembly used in checking thread spacing of worms has an indicator with 0.0002-inch graduations.

**Check No. 1 on Reply Card for more Details**

## Air Line Joint

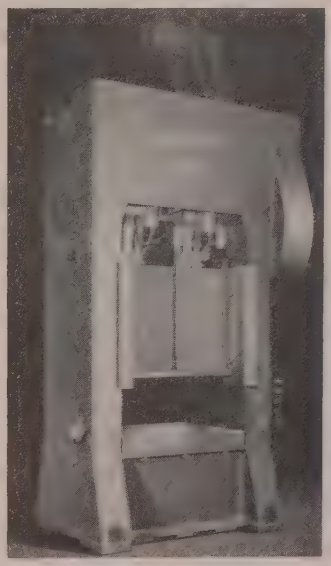
Jets of liquid or air may be directed and maintained to any point or object in a machine operation with the universal air line joint developed by Universal Air-Line-Joint Mfg. Co., Lafayette, Ind. It eliminates frequent adjustments necessary when using pipe or semirigid tubing.

Uses may be with liquid coolant on saws, screw machines, lathes and milling machines and with compressed air on die filers, milling machines and saws. Joints swivel the full 360 degrees and weigh only 3-1/2 ounces. Streamlined aluminum parts offer minimum obstruction to operator's view.

**Check No. 2 on Reply Card for more Details**

## Straight Side Presses

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo 11, N. Y., is manufacturing several new design, all welded straight side presses, of both the single and double crank variety. Illustrated machine is a double crank single geared tie rod frame



press having a rated capacity near bottom stroke of 185 tons. With both single and double geared machines the high speed shaft and flywheel are electro-pneumatic.

Bearings on each side of the backshaft pinion prevent shaft deflection, resulting in better gear tooth contact and reducing gear noise and wear. Deep bed, slide and crown minimize deflection and welded construction permits flexibility in dimensions to suit individual requirements. Use of the Niagara five-way clutch control is optional on any of these machines equipped with the electro-pneumatic friction clutch.

**Check No. 3 on Reply Card for more Details**

## Varispeed Transmission

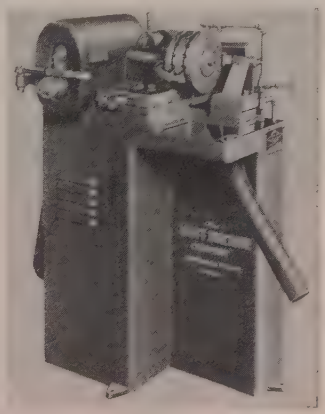
Standard Transmisson Equipment Co., 78 West Union St., Pasadena 1, Calif., is marketing an improved model CUB variable speed transmission with a hardened and ground shaft rotating in a fully sealed double ball bearing assembly. The two outer pulley flanges are fixed to the rotating shaft with the center pulley floating latrally on a large bronze bushing over the hardened shaft.

Ball bearings incorporated in the design increase the life of the drive and at the same increase power output through friction loss reduction. Bearings are sealed against dust and abrasive condition. Transmission is designed for application where a 3.3 to 1 speed range and A-section V-belts are sufficient. Adjustments in speed are by means of lever control while machine is in operation. Size of cast iron machined unit is 2-3/4 x 6-1/2 x 7-1/2 inches.

**Check No. 4 on Reply Card for more Details**

## Screw Slotter

Built primarily for slotting heads of various styles of standard or special screws, the semiautomatic screw slotter, introduced by Kent Machine Co., Cuyahoga Falls, O., may also



be adapted to special light milling operations on the ends of uniform pieces similar to screws. Machine is furnished with a single set of holding disks, but may be furnished with a double disk assembly. Capacity on fillister and button-head screw is 3/8-inch body diameter and 2 inches long; on flat head, 5/16-inch diameter and 2 inches long; on headless, 1/2-inch diameter and 1-1/2 inches long. Width of slot is governed by the saw.

Back gears between the driving spindle and saw carrying spindle allows a variation of cutting speeds for slotting saws. Drive to workholding spindle is through a compound train of change gears. Machine may be arranged for cutting either soft brass or tough steel. Out-

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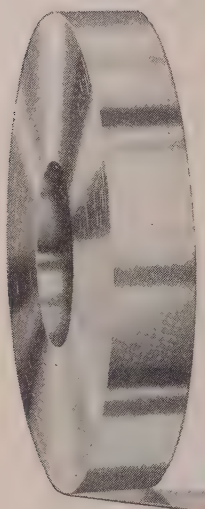

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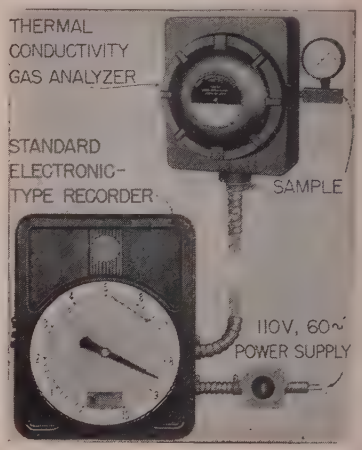
put is limited only by maximum cutting speed of saw and operator's skill in feeding.

Check No. 5 on Reply Card for more Details

## Gas Analyzer

A thermal-conductivity type gas analyzer, developed by Bailey Meter Co., 1050 Ivanhoe Rd., Cleveland 10, O., works on the standard principle of thermal-conductivity gas analysis which measures the rate at which heat is conducted by the gas being sampled. It is mounted in an explosion proof case and is unaffected by voltage variations, ambient temperature and variations in sample pressure. An all alternating current circuit is employed.




Analyzer is stable, fast in response and requires no manual attention or adjustment except for routine maintenance. The standard electronic recorder measuring circuit employs an alternating current potentiometer operating on the highly accurate null balance principle. The recorder uses electron tubes, having no moving parts. Two records of thermal-conductivity or one record combined with another of flow, pressure, temperature, etc., may be placed on one chart.

Check No. 6 on Reply Card for more Details

## Open Gap Press

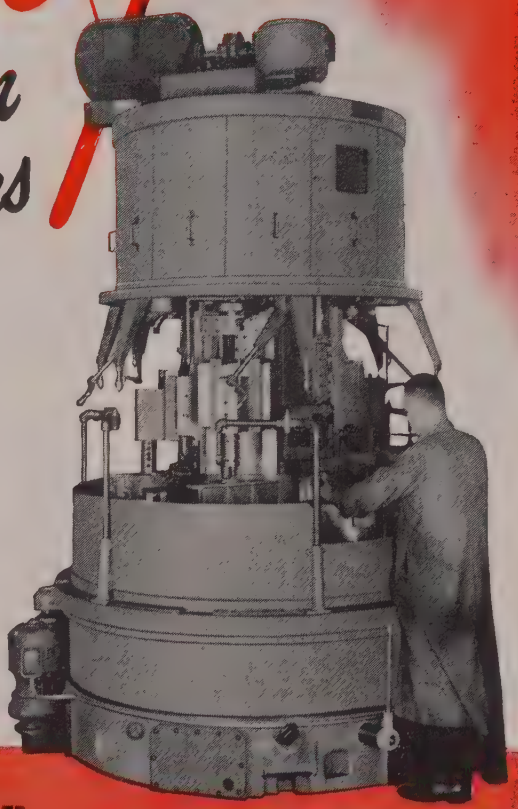
The 250-ton self-contained open gap HydroLectric press shown, manufactured by R. D. Wood Co., 12 South 12th St., Philadelphia 7, Pa., is one of various sizes and capacities made by the company. Sizes of the table and ram head are 30 x 30 inches and 8 x 6 inches, respectively.

Operating hydraulic pressure is supplied by a 2000 pounds per square inch two-stage rotary vane type pump displacing 17.7 gallons per min-

# Accuracy plus economy on odd shaped pieces

. . on the Type "D" . .

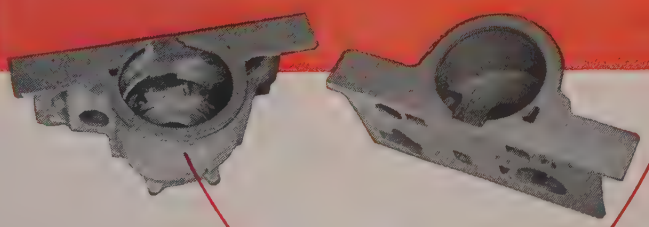
# BULLARD MULT-AU-MATIC



## REPETITIVE ACCURACY

of Mult-Au-Matics is well known throughout the Automotive and other fields, where these machines have proven their ability to lower manufacturing costs. Here this sixteen inch six spindle, Type "D" Mult-Au-Matic is shown at work on an odd shaped piece. This is no problem, since work is chucked in a lying down position rather than hanging it up. Many other features of Mult-Au-Matics save time and lower manufacturing costs. Write for estimates on your work as applied to these machines.

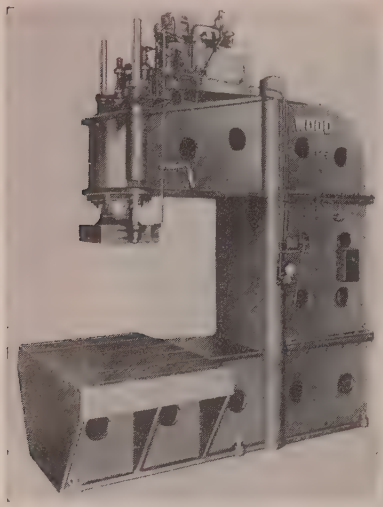
**The Bullard Company, Bridgeport 2, Conn.**



BULLARD

***All in all . . .*** **Use Bullards for manufacturing Economies.**

ute. The pump, with a directly-connected 1200 revolutions per minute motor is mounted on a fabricated oil reservoir on top of the press. Press is furnished with protective devices, safety valves, pressure gage and all necessary valves and con-

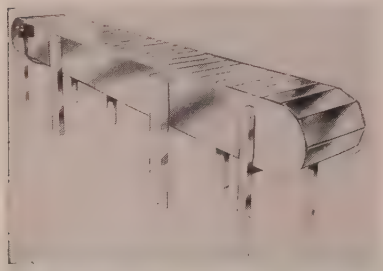


trol equipment. It is controlled by a single four-way operating valve connected by linkage to twin control levers mounted on opposite sides of the press.

**Check No. 7 on Reply Card for more Details**

## Prefabricated Conveyor

Sagless and vibrationless, the belt-plate top of the prefabricated all-aluminum conveyor built by Mercury Conveyors Inc., Hillsdale, N. J., will safely handle parts and assembled goods at variable speeds up to 100



feet per minute in either direction. Each foot of belt is supported by eight or more rollers. Conveyors 18 inches and wider have an added center channel support for greater load capacity.

Belts are offered in widths from 6 to 96 inches and in lengths up to 175 feet or more, depending upon requirements and specifications. Conveyors are prefabricated in 5-foot sections for easy assembly. All units are fully enclosed. They can be adapted to incline movement by the addition of cleats fastened to the belt plates. A drive sprocket arrangement provides a vibrationless and no-slip chain pull.

**Check No. 8 on Reply Card for more Details**

## Filter Cleaner

Initial suction is maintained, filter replacement is reduced and manual filter shakedown is eliminated with the entirely self-contained automatic filter cleaner unit made by Aget-Detroit Co., 409 Main at Washington, Ann Arbor, Mich., for use with its

standard model 1150 Dustkop dust collector. Mechanism consists of a semicircular filter of noninflammable spun glass and a motor-driven nozzle which is enclosed within the assembly to reciprocate continuously over the inner filter surface.

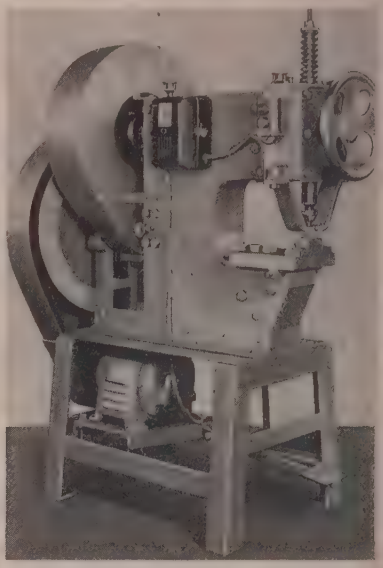
Nozzle is connected by a flexible hose to the collector inlet, providing nozzle suction and establishing a reentry to the cyclone for the lint. Installation is by removing the old filter assembly and placing the new automatic filter in position. Flexible hose and electrical connections complete the installation.

**Check No. 9 on Reply Card for more Details**

## End Punching Machine

Adapted for punching the webs and flanges of small beams and channels such as are used in railing, stair and fire escape work, the model P9 quick acting single end punching machine, built by Julius Blum & Co. Inc., 532 West 22nd St., New York 11, N. Y., has a 12-inch throat and overhanging die block. Machine has a steel plate frame, a chrome-nickel steel crankshaft and a forged steel punch plunger.

The punch can be lowered by hand to assure exact centering. Clutch is nonrepeating. A triple punch attachment can be furnished, enabling the operator to select any one of three punch sizes instantly. Also available are attachments for cutting or notching angles and for cutting



flats, rounds and squares. Drive is by twin V-belts. Control is by push-button and overload protection is provided. Capacity in soft steel is 9/16-inch through 1/2-inch stock or 3/4-inch through 3/8-inch stock. Operation is at 60 strokes per minute.

**Check No. 10 on Reply Card for more Details**

## Portable Power Boosters

Portable power boosters, made by Sage Equipment Co., 30 Essex St., Buffalo 13, N. Y., make it possible to have portable power in any con-

veyor system to maintain continuous flow of material. They also are for use in loading and stacking operations. Desired degree of incline is easily selected by means of a hand wheel.

Belt widths of 8, 10, 12 and 14 inches adapt the boosters to a wide range of products. Equipment in-

# Advanced Performance 5 TO 1

## ON ACME-GRIDLEY CHUCKERS

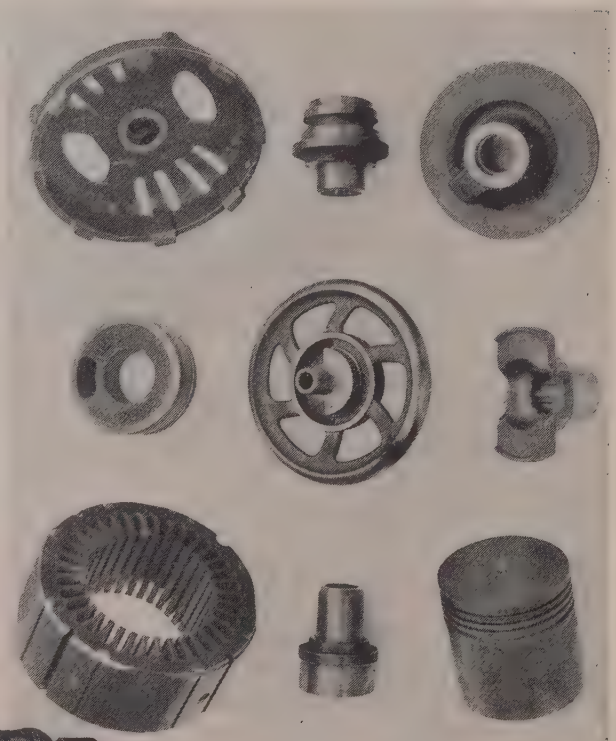
Among last month's shipments were 4 Acme-Gridley chuckers that will produce more parts per day than 20 single spindle machines.

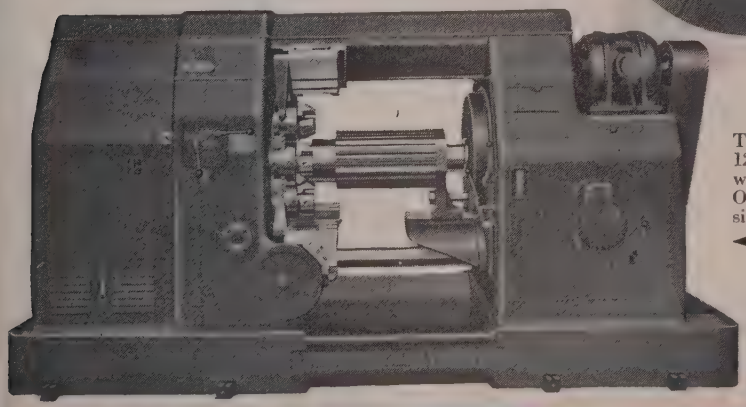
That's what we mean by "advanced performance"—more good pieces in the pan—more finished parts per production dollar. You'll find the answer in the Acme-Gridley design.

From the floor up, model RPA hydraulic chuckers, like Acme-Gridley bar automatics, are *rugged*—built with balance, for permanent accuracy. And they're adaptable; with double indexing they'll finish both ends of a piece on one setup—or make two at a time.

Accuracy is insured by direct, positive camming. The speed comes from easy operation—and from the broad use of attachments, with a design that's built for carbide tooling.

Those are the features that will help you lick the tougher competition to come—in '49. Ask for Acme-Gridley production figures; compare them with your present methods. The results will prove you can't afford to wait. May we help you?





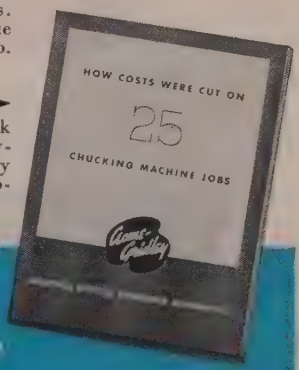
**TYPICAL CHUCKING WORK**

This is the "Big 6"—12" chuck capacity, weight 68,000 lbs. Other 4-6-8 spindle sizes from 5¼" up.

←

→

Ask for this book showing tool layouts on many moneysaving applications.




# The NATIONAL ACME CO.

170 EAST 131st STREET • CLEVELAND 8, OHIO

LARGEST BUILDERS OF MULTIPLE SPINDLE BAR AND CHUCKING AUTOMATICS

cludes 1/3 horsepower 110 volt 60 cycle single-phase motor, floor locks and four heavy duty free-moving casters. Frame is 10 feet long, but special lengths can be funished.

**Check No. 11 on Reply Card for more Details**

## AC Welders

Glenn-Roberts Co. Inc., 2107 Adams St., Indianapolis 18, Ind., is announcing a new line of alternating current welders with ratings from 100 to 2000 amperes. In the utility series, the four models offered have NEMA ratings of 100, 150, 180 and 200 amperes, at 30 volts, 50 per cent duty cycle except for model 180 which has a 25-volt, 20 per cent duty cycle. This model has power factor correction, optional on the other three models.

Production welding requirements are covered by the industrial series. Included are four models for manual welding, NEMA rated at 200, 300, 400 and 500 amperes at 40 volts, 60 per cent duty cycle; 750 and 1000 ampere single transformer models for automatic head welding; and 1000, 1500 and 2000 ampere multiple transformer models for combination manual-automatic use. Power factor correction is standard on all industrial models, along with provision for installation of built-in equipment for inert gas arc welding.

**Check No. 12 on Reply Card for more Details**

## Coolant Cooler

Accuracy of finished product is increased and faster grinding, honing and heavy metal removal is possible with the use of cooled coolant, a cooler for which is a development of Frostrode Products, 2373 East Eight Mile Rd., Hazel Park, Mich. Life of tools, wheels and stones is prolonged. The model 50-AC unit is designed to continuously maintain coolant temperature at a maximum of 20°F below room temperature at rated capacity.

Cooler is completely self-contained and comes completely wired and ready for connection to all types of machine tools. It requires a minimum of floor space and is insulated for high thermal efficiency. A hermetically sealed thermostat with integral controls is provided to maintain any desired temperature between 20° below and 10° above room temperature. Operation is by a 1/2 horsepower motor. The copper tube coil type evaporator employs freon F12.

**Check No. 13 on Reply Card for more Details**

## Air or Steam Hammer

Made in a range of sizes from 50 to 500 pounds falling weight, the expanded capacity range utility hammer made by Chambersburg Engineering Co., Chambersburg, Pa., can handle a variety of jobs from tool dressing and general light blacksmithing to emergency forging of repair parts or maintenance work. Operation may be by either air or steam from plant lines.

Where dies are employed, accurate work is assured by the integrated

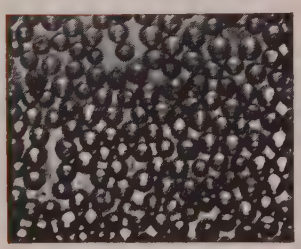
ACCEPTED
BY AMERICA'S LARGEST INDUSTRIAL PLANTS TO DO THE TOUGHEST BLASTING AND PEENING OPERATIONS

HI-GRADE METALLIC

FAMOUS
FOR ITS ABILITY TO STAND UP UNDER REPEATED HARD USE

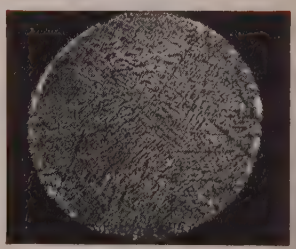
SHOT
- ROUND
- UNIFORM IN SIZE
- UNIFORM IN HARDNESS
- LACKS IRREGULAR SHAPES

GRIT
- RECTANGULAR
- SHARP
- TOUGH
- DURABLE



UNRETOUCHED PHOTO OF HI-GRADE SHOT

CLAYTON-SHERMAN ABRASIVES COMPANY
3896 LONYO ROAD
DETROIT 10, MICHIGAN
CEdar 7200

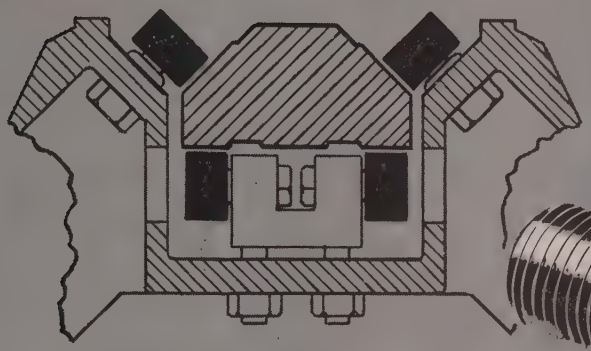


MICROSCOPIC STRUCTURE OF METAL

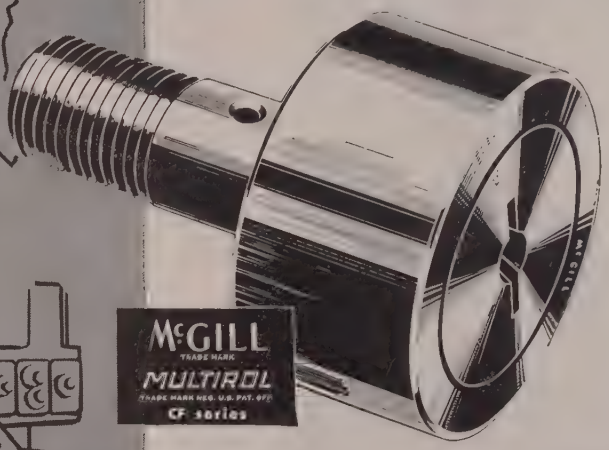
# *Increase Machine Efficiency* *with . . .*

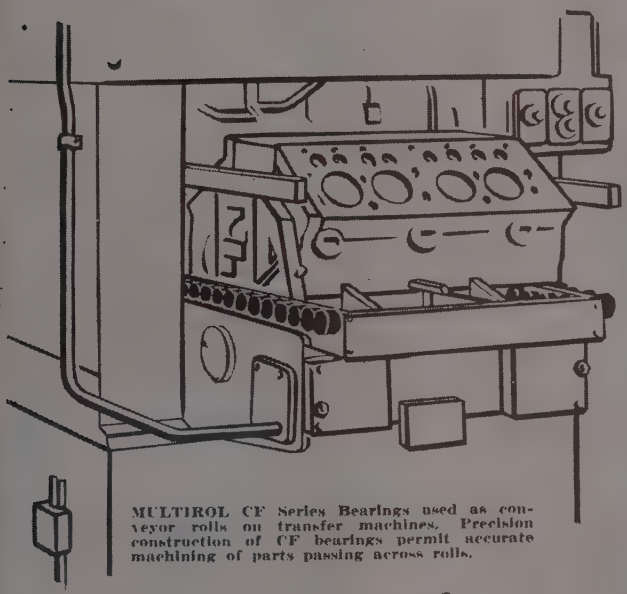
## ANTI-FRICTION PERFORMANCE

## the *MULTIROL* way

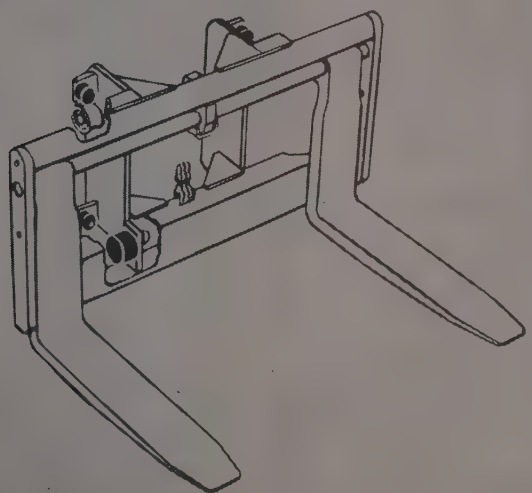


MULTIROL CF Series Bearings as support rollers for oscillating heads and tables on machine tools. Saves costly grinding and scraping of ways.



MULTIROL CF Series Bearings used as conveyor rolls on transfer machines. Precision construction of CF bearings permit accurate machining of parts passing across rolls.



MULTIROL CF Series Bearings as mast and platform guide rollers on lift trucks. Eases lifting and side adjustment of heavier loaded platforms.

When your design goal is the ulumate in anti-friction performance . . . when your specifications include heavier static and shock load capacity . . . then MULTIROL Cam Follower (CF series) bearings are what you've been looking for.

The Cam Follower is a rugged bearing. An extra heavy outer race section stands the repeated shock of cam operation. A full complement of small diameter rollers make up an almost unbroken steel ring which distributes the load evenly over a greater bearing surface. Internal wear and friction are held to the minimum, and power requirements of MULTIROL bearing equipped machines are appreciably lessened. CF bearings are easily lubricated through the stud or face of the bearing and sufficient lubrication is retained for adequate protection of those neglected applications.

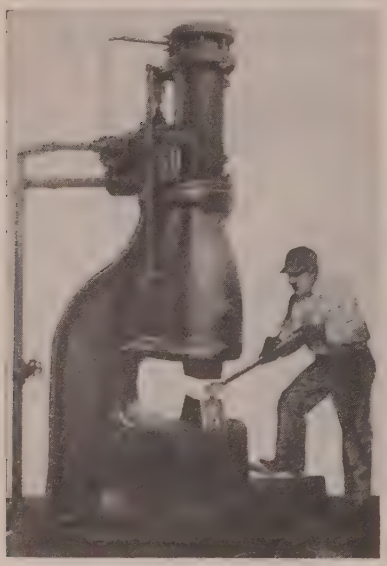
MULTIROL Cam Follower bearings are precision built in a range of twenty-two standard roller diameters from ⅝" to 4". This wide variety eliminates the need for special cam follower specifications in most machine design.

For dependable and long lasting anti-friction applications, at lower cost, investigate MULTIROL CF series bearings. Ask our engineers for their recommendations.

*Write for Bulletin CF-40A. McGILL Manufacturing Company, Inc., 400 North Lafayette Street, Valparaiso, Indiana.*

McGILL
TRADE MARK
precision bearings

frame and anvil cast in one piece. An automatically lubricated power-saving cylinder cuts operating costs. Work manipulation is made easier and the hammer is enabled to forge tougher steels with fewer redressings because of the heat treated, ground face, alloy forge steel flat dies. In-



duction hardened piston rings have prolonged wearing qualities. A self-seating rotary valve directly connected to the throttle control gives greater air or steam efficiency.

**Check No. 14 on Reply Card for more Details**

• • •

**CONTROL VALVE:** A compact flow contol valve, model FC, is designed by Airmatic Valve Inc., Cleveland, O., for a more accurate, automatic control of speed of a cylinder piston stroke without affecting power of the cylinder. It is positioned in the line between the operating valve and cylinder to control speed of air being exhausted from cylinder. It is available in six standard sizes.

**Check No. 15 on Reply Card for more Details**

**OSCILLOSCOPE:** Hickok Electrical Instrument Co., Cleveland 8, O., announced a new 5-inch oscilloscope for industrial and laboratory use. Designated as model 195B, it has high gain amplifiers sensitive to .015 volt (15 millivolts) per inch, 30 cycles to 1 millicycle.

**Check No. 16 on Reply Card for more Details**

**REVERSING CONTACTOR:** A compact alternating current and direct current contactor designed to control small alternating and direct current motors used in connection with small hoists, overhead doors, monorail cranes, etc., is offered by Square D Co., Milwaukee 12, Wis. It consists of double magnet frames and contact blocks with two three-pole armature assemblies mounted on one base and mechanically interlocked.

**Check No. 17 on Reply Card for more Details**

**AUTOMATIC LUBRICATOR:** An automatic lubricator for installation on lines serving compressed air operated tools and equipment is offered by Hannifin Corp., Chicago. It meters oil into the air stream as a fine mist. It is available in 3/8 and 1/2-inch sizes built of noncorrosive materials for line pressures to 150 pounds per square inch.

**Check No. 18 on Reply Card for more Details**

**WIRE ROPE SLINGS:** Palmer-Shile Co., Detroit 27, Mich., offers wire rope slings of improved plow steel. Wires are of six strands, 37 wires to the strand. Slings are manufactured in four ⅛-inch rope diameters from ⅜ to ¾-inch in standard 6 foot lengths.

**Check No. 19 on Reply Card for more Details**

**MIICROSCOPE:** A pocket microscope that adjusts to 40X, 50X and 60X, is available from Buhl Optical Co., Pittsburgh 12, Pa. It is no larger than an ordinary fountain pen, draws out the eyepiece end for power adjustment, carried hooded reflector and knurled collar for fine focusing at object end.

**Check No. 20 on Reply Card for more Details**

**COUPLINGS:** A line of multiple horsepower couplings from 2 to 100 horsepower, at 1750 revolutions per minute, is offered by Lord Mfg. Co., Erie, Pa. Neoprene flexing elements operate in shear and are bonded to steel plates. Couplings require no lubrication.

**Check No. 21 on Reply Card for more Details**

**BUSHINGS:** Kennametal Inc., Latrobe, Pa., offers a line of bushings made of Kennametal grade K6, in twelve outside diameter sizes ranging from ⅝ to 1-inch. Length and inside diameter are made to customer's specifications. Bushings are adaptable to plain cylindrical plug gage members, ring gages, drill jig bushings and other wear-resistant applications.

**Check No. 22 on Reply Card for more Details**

**ELECTRODE:** Designated as Hobart Nickelcast, a nickel electrode for producing machinable welds on cast iron without preheating the metal, is offered by Hobart Brothers Co., Troy, O. They are available in $\frac{3}{32}$, ⅛, $\frac{5}{32}$, and $\frac{1}{16}$-inch diameters.

**Check No. 23 on Reply Card for more Details**

**SOFT HAMMERS:** Soft hammers incorporating in their design a formed tubular steel handle and diamond knurled grip, have been introduced by Univertical Machine Co., Royal Oak, Mich. They are available with either brass or copper cast heads in ½, 1, 1½, 2, 2½, 3, 4, 5 and 6 pound sizes.

**Check No. 24 on Reply Card for more Details**

**NONHAZING RESIN:** Aroplaz 1248-M is a phthalic alkyd resin, available from U. S. Industrial Chemicals Inc., New York 17, N. Y., to give mirror-like finishes with high gloss and gloss retention even in the presence of zinc oxide.

**Check No. 25 on Reply Card for more Details**

**GASKETS, WASHERS, SLEEVES:** A standard line of punched or extruded rubber gaskets, washers and sleeves is offered by Stalwart Rubber Co., Bedford, O. They are available in almost any quantity in such synthetic rubbers as Buna S, Neoprene, Butaprene and Thiokol, and in natural or reclaimed rubbers.

**Check No. 26 on Reply Card for more Details**

**TRUCK WHEEL:** Duo-Thrust industrial truck wheel offered by Globe Co., Chicago 9, Ill., features a newly designed radial angular roller bearing. Bearing itself is of cartridge type with inner race being held stationary on the axle. Bearings and wheels are interchangeable from inside to outside position.

**Check No. 27 on Reply Card for more Details**

**PIPE THREADS:** U. S. Plug & Fitting Co., Canton 5, O., offers an improved standard of pipe threads known as Dryseal and designed to eliminate leakage and to do so without use of sealer compounds or dope of any kind.

**Check No. 28 on Reply Card for more Details**

**FOR MORE INFORMATION**
on the new products and equipment in this section, fill in a card. It will receive prompt attention.

# Market Summary

**OUTLOOK**—Steel market attention is riveted on scrap prices which have broken significantly at most important consuming points after weeks of resistance to the pressure resulting from lack of large consumer buying, rising inventories and general business uncertainty.

Just what weight to attach to the decline is difficult to assess. Before the war scrap developments often foreshadowed impending changes in the steel market proper. Conditions are so different today, however, it is questionable whether this still applies.

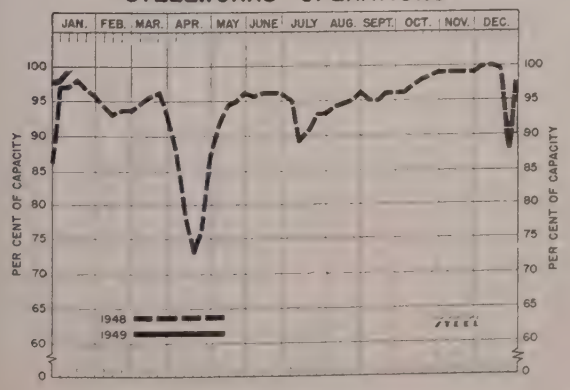
**SCRAP**— The break in prices, more than $2 per ton on steel mill dealer grades, and $5 to $7.50 on foundry grades, was the sharpest experienced in this market since the fall of 1947. It was caused by a combination of factors. Steel mills today are holding the largest stocks in several years, many of them more than 60-days' supplies at near-capacity operations. Moderate winter weather has been conducive to abnormally large collections for the season, and also has aided preparation and shipments. Further, accelerated metalworking operations have been generating a rising flow of scrap to the mills, and imports have been increasing. Meanwhile, signs of easing pressure on the steel mills and foundries has brought about more selective buying of material by the former, and lessened demand from the latter.

**SIGNIFICANCE**—Whether the current price break heralds the return of a buyers' market in scrap is uncertain. Some steelmakers and foundrymen think prices will fall further before they stabilize, and, significantly in this respect, no spurt in buying has followed upon the heels of the price break, though one large steel mill at Pittsburgh purchased 10,000 tons of No. 2 heavy melting dealer scrap at $1.50 to $2 per ton below the price prevailing the week preceding. It is too early, however, to assume that the current price instability is more than a temporary shakeout. While the mills are fortified with substantial inventories, they cannot withhold dealer purchases indefinitely if steelmaking operations are to be continued at the current high level through the first half of the year. Also, it is significant that the present price easiness centers in dealer scrap, with some mills continuing to take in so-called industrial scrap at the old formula levels. Indications are the market is returning to more normal trading habits with price differentials again appearing among the various steelmaking grades.

**DEMAND**— Demand on the steel mills continues to ease from some directions but sufficient business is in sight to assure capacity operations through the first half of the year. Seasonal influences account for some of the easing in pressure. However, since the lull in various areas of the market is the first sustained since the end of the war, more than passing significance is attached to it. In fact, the view is widely held that balance between supply and demand is approaching and that normal conditions in the market are only a matter of months distant. In line with this view the Commerce Department now estimates the 1949 steel supply deficit at under 5 million tons.

**PRICES**—While scrap prices broke sharply last week scattered upward revisions in base prices and extra schedules were reported on a few steel products. For the most part extra cards were involved. At the same time some warehouses have adjusted their prices upward to reflect the recent increase in freight rates. STEEL's arithmetical price composite for finished steel rose to $97.77 from $97.68 and compared with $78.18 for the like week a year ago. The semi-finished steel composite held unchanged at $75.75, as did that on steelmaking pig iron at $46.29. Price composite on steelmaking scrap dropped to $41.92 from $42.58 the preceding week, and compared with $41.92 in the like week last year.

## STEELWORKS OPERATIONS




## DISTRICT STEEL RATES

Percentage of Ingot Capacity engaged in Leading Districts

| | Week Ended Jan. 15 | Change | Same Week 1948 | Same Week 1947 |
|---|---|---|---|---|
| Pittsburgh | 97 | + 1 | 102 | 99 |
| Chicago | 99 | None | 95 | 90 |
| Eastern Pa. | 95 | None | 90 | 85 |
| Youngstown | 105 | None | 103 | 85 |
| Wheeling | 92.5 | + 2.5 | 93.5 | 89 |
| Cleveland | 96.5 | + 2 | 91 | 90.5 |
| Buffalo | 104 | None | 86 | 90.5 |
| Birmingham | 100 | None | 102 | 99 |
| New England | 86 | + 1 | 83 | 80 |
| Cincinnati | 99 | None | 91 | 85 |
| St. Louis | 80 | — 4.5 | 89.5 | 72.5 |
| Detroit | 99 | None | 91 | 93 |
| Estimated national rate | 99 | + 1.5* | 98 | 91 |

*Revised on basis of new 1949 capacity figure. Based on weekly steelmaking capacity of 1,843,516 net tons for 1949; 1,802,476 net tons for 1948; 1,749,928 tons for 1947.

# COMPOSITE MARKET AVERAGES

## Arithmetical Price Composites*

| | Jan. 15 | Jan. 8 | Month Ago Dec. 1948 | Year Ago Jan. 1948 | 5 Years Ago Jan. 1944 |
|---|---|---|---|---|---|
| Finished Steel | $97.77 | $97.68 | $95.50 | $78.26 | $56.73 |
| Semifinished Steel | 75.75 | 75.75 | 75.75 | 60.46 | 36.00 |
| Steelmaking Pig Iron | 46.29 | 46.29 | 46.29 | 38.50 | 23.00 |
| Steelmaking Scrap | 41.92 | 42.58 | 43.25 | 40.75 | 19.17 |

**FINISHED STEEL WEIGHTED COMPOSITE†**

| | |
|---|---|
| Dec. 1948 | 4.11778c |
| Nov. 1948 | 4.11778c |
| Oct. 1948 | 4.12950c |
| Dec. 1947 | 3.49055c |
| Dec. 1943 | 2.38649c |

* **STRAIGHT ARITHMETICAL COMPOSITES:** Computed from average industry-wide mill prices on Finished Carbon Steel (hot-rolled sheets, cold-rolled sheets, cold-rolled strip, hot-rolled bars, plates, structural shapes, basic wire, standard nails, tin plate, standard and line pipe), on Semifinished Carbon Steel (re-rolling billets and slabs, sheet bars, skelp, and wire rods), on Basic Pig Iron (at eight leading producing points), and on Steelworks Scrap (No. 1 melting grade at Pittsburgh, Chicago and eastern Pennsylvania). Steel arithmetical composites, dollars per net ton; pig iron and scrap, gross ton.

† **FINISHED STEEL WEIGHTED COMPOSITE:** Computed in cents per pound, mill prices, weighted by actual monthly shipments of following products, representing about 82 per cent of steel shipments in the latest month for which statistics are available, as reported by American Iron & Steel Institute: Structural shapes; plates, standard rails; hot and cold-finished carbon bars; black butt weld pipe and tubes; black lap weld pipe and tubes; black electric weld pipe and tubes; black seamless pipe and tubes; drawn wire; nails and staples; tin and terne plate; hot-rolled sheets; cold-rolled sheets; galvanized sheets; hot-rolled strip; and cold-rolled strip. December, 1948 figure is preliminary.

# COMPARISON OF PRICES

Representative market figures for current week; average for last month, three months and one year ago. Finished material (except tin plate) and wire rods, cents per lb; semifinished (except wire rods) and coke, dollars per net ton, others dollars per gross ton. Delivered prices represent lowest from mills.

## Finished Materials

| | Jan. 15, 1949 | Dec. 1948 | Oct. 1948 | Jan. 1948 |
|---|---|---|---|---|
| Steel bars, Pittsburgh mills | 3.45c | 3.45c | 3.45c | 2.90c |
| Steel bars, del. Philadelphia | 3.5164 | 3.79 | 3.79 | 3.348 |
| Steel bars, Chicago mills | 3.35 | 3.35 | 3.35 | 2.90 |
| Shapes, Pittsburgh mills | 3.275 | 3.275 | 3.275 | 2.80 |
| Shapes, Chicago mills | 3.25 | 3.25 | 3.25 | 2.80 |
| Shapes, del. Philadelphia | 3.4918 | 3.48 | 3.48 | 2.966 |
| Plates, Pittsburgh mills | 3.50 | 3.50 | 3.50 | 2.80 |
| Plates, Chicago mills | 3.40 | 3.40 | 3.40 | 2.95 |
| Plates, del. Philadelphia | 3.7256 | 3.71 | 3.71 | 3.186 |
| Sheets, hot-rolled, Pittsburgh mills | 3.275 | 3.275 | 3.275 | 2.80 |
| Sheets, cold-rolled, Pittsburgh | 4.00 | 4.00 | 4.00 | 3.55 |
| Sheets, No. 10 galv., Pittsburgh | 4.40 | 4.40 | 4.40 | 3.90 |
| Sheets, hot-rolled, Gary mills | 3.25 | 3.25 | 3.25 | 2.80 |
| Sheets, cold-rolled, Gary mills | 4.00 | 4.00 | 4.00 | 3.55 |
| Sheets, No. 10 galv., Gary mills | 4.40 | 4.40 | 4.40 | 3.90 |
| Strip, hot-rolled, Pittsburgh mills | 3.275 | 3.275 | 3.275 | 2.80 |
| Strip, cold-rolled, Pittsburgh mills | 4.375 | 4.375 | 4.375 | 3.55 |
| Bright basic wire, Pittsburgh | 4.325 | 4.325 | 4.325 | 3.675 |
| Wire nails, Pittsburgh mills | 5.775 | 5.775 | 5.775 | 4.625 |
| Tin plate, per base box, Pitts. dist. | $6.70 | $6.80 | $6.80 | $5.75 |

## Semifinished

| | | | | |
|---|---|---|---|---|
| Sheet bars, mill | $67.00* | $67.00* | $67.00* | $53.57 |
| Slabs, Chicago | 52.00 | 52.00 | 52.00 | 40.18 |
| Rerolling billets, Pittsburgh | 59.00 | 59.00 | 59.00 | 40.18 |
| Wire rod ⅜ to ¼-inch, Pitts. dist. | 3.775c | 3.775c | 3.775c | 3.05c |

* Nominal.

## Pig Iron

| | Jan. 15, 1949 | Dec. 1948 | Oct. 1948 | Jan. 1948 |
|---|---|---|---|---|
| Bessemer, del. Pittsburgh (N.&S. sides) | $48.08 | $48.08 | $48.08 | $40.379 |
| Basic, Valley | 46.00 | 46.00 | 46.00 | 38.40 |
| Basic, eastern del. Philadelphia | 50.3002 | 50.17 | 50.17 | 41.372 |
| No. 2 fdry., del. Pgh. (N.&S. sides) | 47.58 | 47.58 | 47.58 | 39.379 |
| No. 2 fdry., del. Philadelphia | 50.8002 | 50.67 | 50.67 | 41.871 |
| No. 2 foundry, Chicago | 46.25 | 46.25 | 45.13 | 38.60 |
| No. 2 foundry, Valley | 46.50 | 46.50 | 43.50 | 36.50 |
| Southern No. 2 Birmingham | 43.38 | 43.38 | 43.38 | 34.88 |
| Southern No. 2 del. Cincinnati | 49.09 | 49.09 | 49.09 | 37.74 |
| Malleable, Valley | 46.50 | 46.50 | 46.50 | 38.90 |
| Malleable, Chicago | 46.50 | 46.50 | 45.38 | 39.10 |
| Charcoal, low phos., fob Lyles, Tenn. | 66.00 | 66.00 | 66.00 | 50.00 |
| Ferromanganese, f.o.b. Etna, Pa. | 163.00 | 163.00 | 163.00 | 151.00* |

* F.o.b. cars Pittsburgh.

## Scrap

| | | | | |
|---|---|---|---|---|
| Heavy melt. steel, No. 1, Pittsburgh | $42.75 | $42.75 | $42.75 | $40.30 |
| Heavy melt. steel, No. 2, E. Pa. | 39.50 | 41.50 | 41.50 | 42.30 |
| Heavy melt. steel, No. 1, Chicago | 39.75 | 41.75 | 41.75 | 39.05 |
| Heavy melt. steel, No. 1 Valley | 40.75 | 42.75 | 42.75 | 40.04 |
| Heavy melt. steel, No. 1 Cleveland | 40.25 | 42.25 | 42.25 | 39.75 |
| Heavy melt. steel, No. 1, Buffalo | 47.00 | 48.50 | 48.15 | 43.30 |
| Rails for rerolling, Chicago | 64.50 | 70.38 | 65.50 | 60.00 |
| No. 1 cast, Chicago | 65.50 | 70.50 | 70.50 | 63.50 |

## Coke

| | | | | |
|---|---|---|---|---|
| Connellsville, beehive furnace | $14.50 | $14.50 | $14.50 | $12.50 |
| Connellsville, beehive foundry | 17.00 | 17.00 | 17.00 | 14.60 |
| Chicago, oven foundry, ovens | 20.40 | 20.40 | 20.40 | 19.19 |

# FINISHED AND SEMIFINISHED IRON, STEEL PRODUCTS

Finished steel quoted in cents per pound and semifinished in dollars per net ton, except as otherwise noted. Prices apply on an individual producer basis to products within the range of sizes, grades, finishes and specifications produced at its plants.

## Semifinished Steel

**Carbon Steel Ingots:** Rerolling quality, standard analysis, open market, $100-$105 per gross ton. Forging quality, $50 per net ton, mill.

**Alloy Steel Ingots:** $51 per net ton, mill.

**Rerolling Billets, Blooms, Slabs:** $52 per net ton, mill, except: $62, Conshohocken, Pa.; $66, Monessen, Pa.; sales by smaller interests on negotiated basis at $85 per gross ton, or higher.

**Forging Quality Billets, Blooms, Slabs:** $61 per net ton, mill, except: $68, Conshohocken, Pa., mill.

**Alloy Billets, Slabs, Blooms:** Rerolling quality, $63 per net ton, mill except: $70, Conshohocken, Pa.

**Sheet Bars:** $67 nom., per net ton, mill; sales in open market $110-$115 per gross ton.

**Skelp:** 3.25c per lb, mill.

**Tube Rounds:** $76 per net ton, mill; some sellers quoting up to $120 per gross ton.

**Wire Rods:** Basic and acid open-hearth, 7/32 & ⅜-inch, inclusive, 3.40c per lb, mill, except: 3.65c, Struthers, O.; 3.70c, Worcester, Mass.; 4.05c, Pittsburg, Calif.; 4.10c, Portsmouth, O. Los Angeles; 4.15c Monessen, Pa. One producer quotes 3.90c, Chicago base. Basic open-hearth and bessemer, not resulphurized, 7/32 to 47/64-inch, inclusive, 3.50c, mill.

## Bars

**Hot-Rolled Carbon Bars (O.H. only; base 20 tons):** 3.35c, mill, except: 3.55c, Ecorse, Mich., Pittsburgh, Monessen, Aliquippa, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, S. San Francisco, Los Angeles, Niles, Calif., Portland, Oreg., Seattle; 4.20c, Kansas City, Mo.; 4.25c, Minnequa, Colo.; 4.40c, Atlanta; 5.30c, Fontana, Calif.

**Rail Steel Bars: (Base 10 tons):** 3.35c, Moline, Ill., 5.10c, Williamsport, Pa.; another interest quotes 5.35c, mill.

**Hot-Rolled Alloy Bars:** 3.75c, mill, except: 4.05c, Ecorse, Mich.; 4.80c, Los Angeles; 5.50c, Fontana, Calif.

**Cold-Finished Carbon Bars (Base 40,000 lb and over):** 4.00c, mill, except: 3.95c, Pittsburgh, Cumberland, Md.; 4.20c, Indianapolis; 4.25c, Monessen, Pa.; 4.30c, Ecorse, Mich.; 4.35c, St. Louis; 4.36c, Plymouth, Mich.; 4.40c, Newark, N. J., Hartford, Putnam, Conn., Mansfield, Readville, Mass.; 4.45c, Camden, N. J.; 5.30c, Los Angeles.

**Cold-Finished Alloy Bars:** 4.65c, mill, except: 4.75c, Monessen, Pa.; 4.85c, Indianapolis; 4.95c, Worcester, Mansfield, Mass., Hartford.

**High-Strength, Low-Alloy Bars:** 5.10c, mill, except 5.30c, Youngstown; 5.40c, Ecorse, Mich.

**Reinforcing Bars (New Billet):** 3.35c, mill, except: 3.55c, Monessen, Pa.; 4.05c, Pittsburg, Torrance, Calif.; 4.10c, Atlanta, Seattle, S. San Francisco, Los Angeles; 4.25c, Minnequa, Colo. Fabricated: To consumers: 4.25c, mill, except: 5.00c, Seattle.

**Reinforcing Bars (Rail Steel):** 4.65c, Williamsport, Pa., mill; another interest quotes 5.35c, mill.

**Wrought Iron Bars: Single Refined:** 8.60c, (hand puddled), McKees Rocks, Pa.; 9.50c, Economy, Pa. Double Refined: 11.25c (hand puddled), McKees Rocks, Pa., 11.00c, Economy, Pa. Staybolt: 12.75c, (hand puddled), McKees Rocks, Pa.; 11.30c, Economy, Pa.

## Sheets

**Hot-Rolled Sheets (18 gage and heavier):** 3.25c, mill, except: 3.25-3.30c, Cleveland; 3.30c, Pittsburgh; 3.45c, Ecorse, Mich.; 3.95c, Pittsburg, Torrance, Calif.; 5.00c, Conshohocken, Pa.; 5.65c, Fontana, Calif.; 6.25c, Kansas City, Mo.

**Hot-Rolled Sheets (19 gage and lighter, annealed):** 4.15c, mill, except: 4.40c, Alabama City, Ala.; 4.65c, Niles, O.; 5.05c, Torrance, Calif., Kokomo, Ind.

**Cold-Rolled Sheets:** 4.00c, mill, except: 4.20c, Ecorse, Mich.; 4.70c, Granite City, Ill.; 4.95c, Pittsburg, Calif.

**Galvanized Sheets, No. 10:** (Based on 5 cent zinc) 4.40c, mill, except: 5.00c, Niles, O.; 5.15c, Pittsburg, Torrance, Calif.; 5.30c, Kokomo, Ind.

**Galvannealed Sheets:** 4.95c, mill, except: 5.05c, Indiana Harbor, Ind.; 5.55c, Niles, O.; 5.70c, Kokomo, Ind.

**Culvert Sheets, No. 16 flat Copper Steel** (based on 5-cent zinc): 5.00c, mill, except: 5.40c, Granite City, Ill.; 5.45c, Kokomo, Ind.; 5.75c, Pittsburg, Torrance, Calif.

**Long Ternes, No. 10 (Commercial quality):** 4.80c, mill

**Enameling Sheets, No. 12:** 4.40c, mill, except: 4.60c, Granite City, Ill.; 4.70c, Ecorse, Mich.; 6.00c, Niles, O.

**Silicon Sheets, No. 24: Field:** 5.15c, mill. Armature: 5.45c, mill, except: 5.95c, Warren, O.; 6.05c, Niles, O.

Electrical: Hot-rolled, 5.95c, mill, except: 6.05c, Kokomo, Ind.; 6.15c, Granite City, Ill.; 6.45c, Warren, O.; 6.55c, Niles, O.

Motor: 6.70c mill except: 6.90c, Granite City, Ill.; 7.20c, Warren, O.; 7.95c, Follansbee, W. Va., Toronto, O.; 9.20c, Brackenridge, Pa.

Dynamo: 7.50c, mill, except: 8.65c, Follansbee, W. Va., Toronto, O.; 7.70c, Granite City, Ill.; 10.00c, Brackenridge, Pa.

Transformer 72, 8.05c, mill, except: 9.15c, Follansbee, W. Va., Toronto, O.; 11.80c, Brackenridge, Pa.; 65, 8.60c, mill, except: 9.85c, Follansbee, W. Va., Toronto, O.; 12.35c, Brackenridge, Pa.; 58, 9.30c, mill except: 10.55c, Follansbee, W. Va., Toronto, O.; 13.05c, Brackenridge, Pa.; 52, 10.10c, mill, except: 11.35c, Follansbee, W. Va., Toronto, O.

**High-Strength Low-Alloy Sheets:** Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich., and Conshohocken, Pa., mills.

Galvanized (No. 10), 6.75c, mill.

Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse, Mich.

## Strip

**Hot-Rolled Strip:** 3.25c mill, except: 3.30c, Cleveland, Pittsburgh, Riverdale, Ill.; 3.25-3.35c,* Sharon, Pa.; 3.45c, Ecorse, Mich.; 3.60c, Detroit; 3.65c, Atlanta; 3.70c, West Leechburg, Pa.; 4.00c, Pittsburg, Torrance, Calif.; 4.25c, Seattle, S. San Francisco, Los Angeles; 4.20c, Kansas City, Mo.; 4.30c, Minnequa Colo.; 5.90c, Fontana, Calif. One company quotes 4.90c, Pittsburgh base.

* Wider than 6-in. and 6-in. and narrower respectively.

**Cold-Rolled Strip** (0.25 carbon and less): 4.00c, mill, except 4.00-4.25c, Warren, O.; 4.00-4.50c, Youngstown; 4.20c, Ecorse, Mich.; 4.25c, Riverdale, Ill.; 4.40-4.50c, Detroit; 4.50c, New Haven, Corn., West Leechburg, New Castle, Pa., Boston; 4.75c, Dover, O., New Kensington, Pa.; 4.50-5.00c, Trenton, N. J.; 4.80-5.05c, Wallingford, Conn.; 5.75c, Los Angeles; 7.10c, Fontana, Calif. One company quotes 4.55c, Cleveland or Pittsburgh base, and 4.75c, Worcester, Mass., base; another, 5.00c, Pittsburgh base.

**Cold-Finished Spring Steel:** 0.26-0.40 C, 4.00c, mill, except: 4.25c, Dover, O., Chicago; 4.30c, Worcester, Mass.; 4.50c, New Castle, Pa., Boston, Youngstown; 4.75c, Wallingford, Conn. Over 0.40 to 0.60 C, 5.50c, mill, except: 5.65c, Chicago; 5.75c, Dover, O.; 5.80c, Worcester, Mass., Wallingford, Conn., Trenton, N. J.; 5.95c, Boston; 6.00c, New Castle, Pa. Over 0.60 to 0.80 C, 6.10c, mill, except: 6.25c, Chicago; 6.35c, Dover, O.; 6.40c, Worcester, Mass., Wallingford, Bristol, Conn., Trenton, N. J.; 6.60c, New Castle, Pa. Over 0.80 to 1.05 C, 8.05c, mill, except: 7.85c, Dover, O.; 8.20c, Chicago; 8.35c, Worcester, Mass., Bristol, Conn., Trenton, N. J. Over 1.05 to 1.35 C, 10.35c, mill, except: 10.15c, Dover, O.; 10.30c, Wallingford, Conn.; 10.50c, Chicago; 10.65c, Worcester, Mass., Trenton, N. J.

**Cold-Rolled Alloy Strip:** 9.50c, mill except: 9.80c, Worcester, Mass.

**High-Strength, Low-Alloy Strip:** Hot-rolled, 4.95c, mill, except: 5.15c, Youngstown; 5.25c, Ecorse, Mich., mill. Cold-rolled, 6.05c, mill, except: 6.25c, Youngstown; 6.35c, Ecorse Mich., mill.

## Tin, Terne Plate

**Tin Plate:** American Coke, per base box of 100 lb, 1.25 lb coating $7.50-$7.70; 1.50 lb coating $7.75-$7.95. Pittsburg, Calif., mill $8.25 and $8.50, respectively, for 1.25 and 1.50 lb coatings.

**Electrolytic Tin Plate:** Per base box of 100 lb, 0.25 lb tin, $6.45-$6.65; 0.50 lb tin, $6.70-$6.90; 0.75 lb tin, $7.00-$7.20.

**Can Making Black Plate:** Per base box of 100 lb, 55 to 128 lb basis weight $5.75-$5.85. Pittsburg, Calif., mill, $6.50.

**Holloware Enameling Black Plate:** 29-gage, 5.30c per pound, except: 5.40c, Sparrows Point, Md.; 5.50c, Granite City, Ill.

**Manufacturing Ternes (Special Coated):** Per base box of 100 lb, $6.65, except: $6.75 Fairfield, Ala., Sparrows Point, Md.

**Roofing Ternes:** Per package 112 sheets; 20 x 28 in., coating I.C. 8-lb, $15.50.

## Plates

**Carbon Steel Plates:** 3.40c, mill, except: 3.40-3.60c, Cleveland; 3.45c, Sparrows Point, Md., Johnstown, Pa., Lackawanna, N. Y.; 3.60c, Pittsburgh; 3.65c, Ecorse, Mich.; 3.75c, Coatesville, Pa.; 3.95c, Claymont, Del., Conshohocken, Pa.; 4.30c, Seattle, Minnequa, Colo.; 4.56c, Houston, Tex.; 5.80c, Fontana, Calif.; 6.50c, Harrisburg, Pa.; 6.25c, Kansas City, Mo.

**Floor Plates:** 4.55c, mill.

**Open-Hearth Alloy Plates:** 4.40c, mill, except: 5.10c, Coatesville, Pa., mill.

**High-Strength, Low-Alloy Plates:** 5.20c mill, except: 5.10c, Coatesville, Pa.; 5.30c, Conshohocken, Pa., Sparrows Point, Md., Johnstown, Pa.; 5.40c, Youngstown; 5.65c, Ecorse, Mich., Sharon, Pa.

## Shapes

**Structural Shapes:** 3.25c, mill, except: 3.30c, Bethlehem, Pa., Lackawanna, N. Y., Johnstown, Aliquippa, Pa.; 3.85c, Torrance, Calif.; 4.15c, Minnequa, Colo.; 4.30c, Seattle, S. San Francisco, Los Angeles; 5.75c, Fontana, Calif.

**Alloy Structural Shapes:** 4.05c, mill.

**Steel Sheet Piling:** 4.05c, mill.

**High-Strength, Low-Alloy Shapes:** 4.95c, mill. except: 5.05c, Bethlehem, Johnstown, Pa., Lackawanna, N. Y.; 5.15c, Youngstown.

## Wire and Wire Products

**Wire to Manufacturers (carloads):** Bright, Basic or Bessemer Wire, 4.15c, mill, except: 4.25c, Sparrows Point, Md., Kokomo, Ind.; 4.45c, Worcester, Mass.; 4.50c, Monessen, Pa.; Minnequa, Colo., Atlanta, Buffalo; 4.70c, Portsmouth, O.; 4.80c, Palmer, Mass.; 5.10c, Pittsburg, Calif.; 5.15c, S. San Francisco; 5.40c, Shelton, Conn. One producer quotes 4.50c, Chicago base; another, 4.50c, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

**Basic MB Spring Wire,** 5.55c, mill, except: 5.30c, Portsmouth, O.; 5.65c, Sparrows Point, Md., Monessen, Pa.; 5.85c, Worcester, Palmer, Mass., Trenton, N. J.; 6.50c, Pittsburg, Calif.

**Upholstery Spring Wire,** 5.20c mill, except: 5.30c, Sparrows Point, Md., Williamsport, Pa.; 5.50c, Worcester, Mass., Trenton, N. J., New Haven, Conn.; 6.15c, Pittsburg, Calif.

**Wire Products to Trade (carloads): Merchant Quality Wire: Annealed** (6 to 8 Gage base), 4.80c, mill, except: 4.90c, Sparrows Point, Md.; 4.95c, Monessen, Pa ; 5.10c, Worcester, Mass.; 5.15c, Minnequa, Colo., Kokomo, Ind.; 5.20c, Atlanta; 5.75c, S. San Francisco, Pittsburg, Calif. One producer quotes 5.15c, Chicago and Pittsburgh base; another, 5.20c. Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

**Galvanized** (6 to 8 Gage base), 5.25c, mill, except: 5.35c, Sparrows Point, Md.; 5.40c, Monessen, Pa.; 5.55c, Worcester, Mass.; 5.60c, Kokomo, Ind., Minnequa, Colo.; 5.65c, Atlanta; 6.20c, Pittsburgh, S. San Francisco, Calif. One producer quotes 5.60c, Pittsburgh and Chicago base; another, 5.65c, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

**Nails and Staples:** Standard, cement-coated and galvanized nails and polished and galvanized staples, Column 103, mill, except: 105, Sparrows Point, Md., Kokomo, Ind.; 109 Worcester, Mass.; 110 Minnequa, Colo., Atlanta; 117, Portsmouth, O.; 123, Pittsburg, Calif.; 124, Cleveland; 126, Monessen, Pa.; $6.75 per 100 pound keg, Conshohocken, Pa., Wheeling, W. Va. One producer quotes column 109, Chicago and Pittsburgh base; another, column 113, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

**Woven Fence** (9 to 15½ Gage, inclusive): Column 109, mill, except: 113, Monessen, Pa., Kokomo, Ind.; 116, Minnequa, Colo.; 121 Atlanta; 132, Pittsburg, Calif. One producer quotes column 113, Pittsburgh and Chicago base; another column 114, Crawfordsville, Ind., freight equalized with Pittsburgh and Birmingham.

**Barbed Wire:** Column 123 mill, except: 125, Sparrows Point, Md., Kokomo, Ind.; 126, Atlanta; 128, Monessen, Pa.; 130, Minnequa, Colo.; 143, Pittsburg, Calif.; 145, S. San Francisco. One producer quotes 127, Chicago and Pittsburgh base.

**Fence Posts** (with clamps): Column 114, Duluth; 115, Johnstown, Pa.; 116, Moline, Ill.; 122, Minnequa, Colo.; $123.50 per net ton, Williamsport, Pa.

**Bale Ties** (single loop): Column 106, mill, except: 108, Sparrows Point, Md., Kokomo, Ind.; 110, Atlanta; 113 Minnequa, Colo.; 130, S. San Francisco, Pittsburg, Calif. One producer quotes column 115, Crawfordsville, Ind., freight equalized with Birmingham and Pittsburgh.

## Stainless Steels

(Mill prices, cents per pound)

**CHROMIUM NICKEL STEELS**

| Type No. | Bars, Wire Shapes | Strip, Cold-Rolled | Sheets |
|---|---|---|---|
| 301 | 28.50-28.75 | 30.50-32.00 | 37.50-40.75 |
| 302 | 28.50-28.75 | 33.00-33.75 | 37.50-40.75 |
| 303 | 31.00-31.50 | 36.50-39.75 | 39.50-43.00 |
| 304 | 30.00-31.25 | 35.00-35.75 | 39.50-43.00 |
| 316 | 46.00-48.00 | 55.00-57.25 | 53.00-57.25 |
| 347 | 38.50-39.75 | 48.50-50.25 | 50.00-54.00 |

**STRAIGHT CHROMIUM STEELS**

| | | | |
|---|---|---|---|
| 410 | 22.75-23.00 | 26.50-27.00 | 32.00-33.00 |
| 416 | 23.25-23.50 | 28.25-33.50 | 32.50-33.50 |
| 430 | 23.25-23.50 | 27.00-27.50 | 34.75-35.50 |
| 446 | 32.50-33.00 | 60.00-62.25 | 46.50-50.00 |

**STAINLESS-CLAD STEELS**

| | Plates —Cladding— | | Sheets —Cladding— | |
|---|---|---|---|---|
| | 10% | 20% | 10% | 20% |
| 302 | .... | .... | 19.75 | 21.50 |
| 304 | 22.50 | 26.50 | 20.75 | 22.50 |
| 310 | 32.50 | 36.50 | .... | .... |
| 316 | 27.00 | 31.00 | 26.00 | 28.00 |
| 321 | 23.50 | 27.50 | .... | .... |
| 347 | 25.00 | 29.00 | 24.00 | 26.00 |
| 405 | 18.75 | 24.75 | .... | .... |
| 410 | 18.25 | 24.25 | .... | .... |
| 430 | 18.25 | 24.25 | .... | .... |

## Tool Steels

**Tool Steel:** Cents per pound, producing plants; reg. carbon 19.00c; extra carbon 22.00c; special carbon 26.50c; oil-hardening 29.00c; high carbon-chromium 52.00c; chrome hot work, 29.00c.

| W | Cr | V | Mo | Co | Base Per lb |
|---|---|---|---|---|---|
| 18 | 4 | 1 | ... | ... | 90.50c |
| 18 | 4 | 2 | ... | ... | 102.50c |
| 18 | 4 | 3 | ... | ... | 114.50c |
| 18 | 4 | 2 | ... | 8 | 168.50c |
| 1.5 | 3 | 1 | 8.5 | ... | 85.00c |
| 6.4 | 4.5 | 1.9 | 5 | ... | 69.50c |
| 6 | 4 | 3 | 6 | ... | 88.00c |

## Tubular Goods

**Standard Steel Pipe:** Mill prices in carlots, threaded and coupled, to consumers about $200 a net ton.

| In. | Butt Weld Blk. | Gal. | In. | Blk. | Gal. |
|---|---|---|---|---|---|
| ⅛ | 39½– | 8½– | 1 | 46– | 25– |
| | 41½ | 12½ | | 48½ | 27½ |
| ¼ | 37½– | 9½– | 1¼ | 46½– | 25½– |
| | 39½ | 14 | | 49 | 28 |
| ⅜ | 34– | 4½– | 1½ | 47– | 26– |
| | 36 | 9 | | 49½ | 28½ |
| | | | 2 | 47½– | 26½– |
| ½ | 40½– | 18– | | 50 | 29 |
| | 43 | 21½ | 2½, 3 | 48– | 27– |
| ¾ | 43½– | 22– | | 50½ | 29½ |
| | 46 | 24½ | 3½ & 4 | 44½ | 22½ |

| In. | Lap Weld Blk. | Gal. | Elec. Weld Blk. | Gal. | Seamless Blk. | Gal. |
|---|---|---|---|---|---|---|
| 2 | 39½ | 17½ | 38½ | 16½ | 27– | 5– |
| | | | | | 38½ | 17 |
| 2½ | 42½– | 20½– | 41½ | 19½ | 32½– | 10½– |
| | 43½ | 21½ | | | 41½ | 20 |
| 3 | 42½– | 20½– | 41½ | 19½ | 35– | 13– |
| | 43½ | 21½ | | | 41½ | 20 |
| 3½&4 | 42½– | 20½– | 43½ | 21½ | 38½– | 16½– |
| | 46½ | 24½ | | | 43½ | 22 |
| 5 & 6 | 42½– | 20½– | 43½ | 21½ | 38½– | 16½– |
| | 44½ | 22½ | | | 43½ | 22 |
| 7 | .... | .... | .... | .... | 43¼ | 20½ |

**Line Steel Pipe:** Mill prices in carlots to consumers about $200 a net ton.

| In. | Butt Weld Blk. | Gal. | In. | Butt Weld Blk. | Gal. |
|---|---|---|---|---|---|
| ⅛ | 40½ | .... | 1¼ | 46– | 26– |
| ¼ | 38½ | .... | | 48 | 27 |
| ⅜ | 35 | .... | 1½ | 46½– | 26½– |
| ½ | 40– | 18½– | | 48½ | 27½ |
| | 42 | 19½ | 2 | 47– | 26½– |
| ¾ | 43– | 22½– | | 49 | 28 |
| | 45 | 23½ | 2½ & 3 | 47½– | 27– |
| 1 | 45½– | 25½– | | 49½ | 28½ |
| | 47½ | 26½ | 3½ & 4 | 43½ | .... |

| In. | Lap Weld Blk. | Gal. | Elec. Weld Blk. | Gal. | Seamless Blk. | Gal. |
|---|---|---|---|---|---|---|
| 2 | 38½ | 16½ | 37½ | 15½ | 26– | 4– |
| | | | | | 37½ | 16 |
| 2½ | 42½ | 20½ | 40½ | 19½ | 31½– | 9½– |
| | | | | | 40½ | 19 |
| 3 | 42½ | 20½ | 40½ | 19½ | 34– | 12– |
| | | | | | 40½ | 19 |
| 3½-4 | 41½– | 20– | 42½ | 20½ | 37½– | 15½– |
| | 45½ | 23½ | | | 42½ | 21 |
| 5 & 6 | 41½– | 20 | 42½ | 20½ | 37½– | 15½– |
| | 43½ | | | | 42½ | 21 |
| 8 | 45½ | .... | 44½ | 21½– | 40½– | 17½– |
| | | | | 22 | 44½ | 22 |
| 10 | 45 | .... | 44 | 21– | 41½– | 18½– |
| | | | | 21½ | 44 | 21½ |
| 12 | 44 | .... | 43 | 20 | 40½– | 17½– |
| | | | | | 43 | 20½ |

**Standard Wrought Iron Pipe:** Mill price in carlots, threaded and coupled, to consumers about $200 a net ton.

| In. | Butt Weld Blk. | Gal. | In. | Lap Weld Blk. | Gal. |
|---|---|---|---|---|---|
| ⅜ | +59½ | +95½ | 1¼ | +22 | +53 |
| ½ | +20½ | +52½ | 1½ | +15½ | +45½ |
| ¾ | +10½ | +41½ | 2 | + 7½ | +36½ |
| 1 and | | | 2½-3½ | + 5 | +32 |
| 1¼ | + 4½ | +32½ | 4 | List | +26 |
| 1½ | — 1½ | +29 | 4½-8 | + 2 | +27½ |
| 2 | — 2 | +28½ | 9-12 | +12 | +37 |

**Boiler Tubes:** Net base c.l. prices, dollars per 100′, mill; minimum wall thickness, cut lengths 4 to 24″; inclusive.

(Following prices on seamless boiler tubes raised 10% by Babcock & Wilcox Tube Co. as of Nov. 22.)

| O.D. In. | B.W. Ga. | Seamless Hot Rolled | Seamless Cold Drawn | Elec. Weld, Hot Rolled | Elec. Weld, Cold Drawn |
|---|---|---|---|---|---|
| 1 | 13 | .... | 13.39 | 13.00 | 13.00 |
| 1¼ | 13 | .... | 15.87 | 13.21 | 15.39 |
| 1½ | 13 | $15.05 | 17.71 | 14.60 | 17.18 |
| 1¾ | 13 | 17.11 | 20.15 | 16.60 | 19.54 |
| 2 | 13 | 19.18 | 22.56 | 18.60 | 21.89 |
| 2¼ | 12 | 23.54 | 27.70 | 22.83 | 26.88 |
| 2½ | 12 | 25.79 | 30.33 | 25.02 | 29.41 |
| 2¾ | 12 | 27.93 | 32.14 | 26.51 | 31.18 |
| 3 | 12 | 28.68 | 33.76 | 27.82 | 32.74 |
| 3¼ | 11 | 33.39 | 39.29 | 32.39 | 38.11 |
| 3½ | 11 | 35.85 | 42.20 | 34.78 | 40.94 |
| 4 | 10 | 44.51 | 52.35 | 43.17 | 50.78 |

**Pipe, Cast Iron:** Class B, 6-in. and over, $93.50 per net ton, Birmingham; $106.70, del. Chicago; 4-in. pipe, $5 higher; Class A pipe, $5 a ton over Class B.

## Rails, Supplies

**Rails:** Standard, over 60-lb; $3.20 per 100 lb. mill, except: $3.50, Indiana Harbor, Ind., and Minnequa, Colo.

**Light** (billet): $3.55 per 100 lb, mill, except: $4.25, Minnequa, Colo.

**Light** (rail steel): $5.10 per 100 lb., Williamsport, Pa.

**Railroad Supplies:** Track bolts, treated: $8.50 per 100 lb, mill. Untreated: $8.25, mill.

**Tie Plates:** 4.05c mill, except: 4.20c, Pittsburg, Calif.; 4.50c, Seattle.

**Splice Bars:** 4.25c, mill.

**Standard Spikes:** 5.35c, mill, except: 5.25c, Pittsburgh.

**Axles:** 5.20c, mill.

# RAW MATERIAL AND FUEL PRICES

Minimum delivered prices do not include 3 per cent federal tax.

## Pig Iron

Per gross Ton

| | Basic | No. 2 Foundry | Malleable | Bessemer |
|---|---|---|---|---|
| **Bethlehem, Pa.,** furnace .... | $48.00 | $48.50 | $49.00 | $49.50 |
| Newark, N. J., del. ..... | 50.5334 | 51.0334 | 51.5334 | 52.0334 |
| Brooklyn, N. Y., del. ..... | .... | 52.634 | 53.134 | .... |
| Philadelphia, del. ..... | 50.3002 | 50.8002 | 51.3002 | 51.8002 |
| **Birmingham,** furnace ..... | 42.88 | 43.38 | .... | .... |
| Cincinnati, del. ..... | .... | 49.43 | .... | .... |
| **Buffalo,** furnace ..... | *47.00 | *47.00 | *47.50 | 48.00 |
| Boston, del. ..... | 56.20 | 56.20 | 56.70 | .... |
| Rochester, del. ..... | 49.35 | 49.35 | 49.85 | 50.35 |
| Syracuse, del. ..... | 50.2065 | 50.2065 | 50.7065 | 41.2065 |
| §**Chicago,** district furnaces .. | 46.00 | 46.00-46.50 | 46.50 | 47.00 |
| Milwaukee, del. ..... | 47.82 | 47.82-48.32 | 48.32 | 48.82 |
| Muskegon, Mich., del. .... | .... | 51.28-51.78 | 51.78 | .... |
| **Cleveland,** furnace ..... | 46.00 | 46.50 | 46.50 | 47.00 |
| Akron, del. ..... | 48.17 | 48.67 | 48.67 | 49.17 |
| **Lone Star, Tex.,** furnace .... | .... | †75.00 | .... | .... |
| **Duluth,** furnace ..... | .... | 46.50 | 46.50 | 47.00 |
| **Erie, Pa.,** furnace ..... | 46.00 | 46.50 | 46.50 | 47.00 |
| **Everett, Mass.,** furnace .... | .... | 52.75 | 53.25 | .... |
| **Geneva, Utah,** furnace ..... | 46.00 | 46.50 | .... | .... |
| Seattle, Tacoma, Wash., del. | .... | 54.0578 | .... | .... |
| Portland, Oreg., del. ..... | .... | 54.0578 | .... | .... |
| Los Angeles, San Francisco. | 53.5578 | 54.0578 | .... | .... |
| **Granite City, Ill.,** furnace ... | 47.90 | 48.40 | 48.90 | .... |
| St. Louis, del. ..... | 49.40 | 49.90 | 50.40 | .... |
| **Ironton, Utah,** furnace ..... | .... | 46.50 | .... | .... |
| ‡**Neville Island, Pa.,** furnace. | 46.00 | 46.50 | 46.50 | 47.00 |
| Pittsburgh, del., N.&S. Sides | 47.08 | 47.58 | 47.58 | 48.08 |
| **Pittsburgh (Carnegie),** furnaces | 46.00 | .... | .... | 47.00 |
| **Sharpsville, Pa.,** furnace .... | 46.00 | 46.50 | 46.50 | 47.00 |
| **Steelton, Pa.,** furnace ..... | 48.00 | 48.50 | 49.00 | 49.50 |
| **Struthers, O.,** furnace ..... | 42.50 | .... | .... | .... |
| **Swedeland, Pa.,** furnace .... | 50.00 | 50.50 | 51.00 | .... |
| **Toledo, O.,** furnace ..... | 46.00 | 46.50 | 46.50 | 47.00 |
| Cincinnati, del. ..... | 50.55 | 51.05 | .... | .... |
| **Youngstown, O.,** furnace .... | 46.00 | 46.50 | 46.50 | 47.00 |
| Mansfield, O., del. ..... | 49.87 | 50.37 | 50.37 | 50.87 |

* Republic Steel Corp. quotes $1 a ton higher for basic, No. 2 foundry and malleable at Buffalo.
† Low phosphorus southern grade.
‡ To Neville Island base add: $0.86 for McKees Rocks, Pa.; $1.31 Lawrenceville, Homestead, McKeesport, Monaca; $1.73 Verona; $1.94 Brackenridge; $1.08 for Ambridge and Aliquippa.
§ Includes, in addition to Chicago, South Chicago, Ill., East Chicago, Gary and Indiana Harbor, Ind.

### Blast Furnace Silvery Pig Iron

6.00-6.50 per cent Si (base) .$59.50
6.51-7.00 .. 60.75 9.01- 9.50. 67.00
7.01-7.50 .. 62.00 9.51-10.00. 68.25
7.51-8.00 .. 63.25 10.01-10.50. 69.50
8.01-8.50 .. 64.50 10.51-11.00. 70.75
8.51-9.00 .. 65.75 11.01-11.50. 72.00
F.o.b. Jackson, O., per gross ton. Buffalo furnace $1.25 higher.

### Bessemer Ferrosilicon

Prices same as for blast furnace silvery iron, plus $1 per gross ton.

**Electric Furnace Silvery Pig Iron** Si 14.01-14.50%, $84.75 furnace, Niagara Falls; $84 open-hearth and $85 foundry grade, Keokuk, Iowa. Add $1 a ton for each additional 0.5% Si to 18%; 50c for each 0.5% Mn over 1%; $1 a ton for 0.45% max. phos.

### Charcoal Pig Iron

Semi-cold blast, low phosphorus. F.o.b. furnace, Lyles, Tenn. ..$66 (For higher silicon iron a differential over and above the price of base grade is charged as well as for the hard chilling iron, Nos. 5 and 6.)

### Low Phosphorus

Steelton, Pa., $54; Buffalo, Troy, N. Y., $50; Philadelphia, $56.9786 delivered.

Intermediate phosphorus, Central furnace, Cleveland, $51.

### Differentials

Prices are subject to following differentials:

**Silicon:** An additional charge of 50 cents a ton for each 0.25 per cent silicon in excess of base grade (1.75% to 2.25%).

**Phosphorus:** A reduction of 38 cents a ton for phosphorus content of 0.70 per cent and over.

**Manganese:** An additional charge of 50 cents a ton for each 0.50 per cent, or portion thereof, manganese in excess of 1%.

**Nickel:** An additional charge for nickel content as follows: Under 0.50%, no extra; 0.50% to 0.74%, inclusive, $2 a ton; for each additional 0.25% nickel, $1 a ton.

## Fluorspar

Metallurgical grade, f.o.b. shipping point, in Ill., Ky., net tons, carloads, effective $CaF_2$ content, 70% or more, $37; less than 60%, $34.

## Metallurgical Coke

Price per Net Ton

### Beehive Ovens

| | |
|---|---|
| Connellsville, furnace.. | $13.50-15.50 |
| Connellsville, foundry.. | 16.00-18.00 |
| New River, foundry.... | 16.50 |
| Wise county, foundry.. | 15.35 |
| Wise county, furnace.. | 14.60 |

### Oven Foundry Coke

| | |
|---|---|
| **Kearney, N. J.,** ovens.. | $21.50 |
| **Chicago,** ovens ..... | 20.40 |
| Chicago, del. ..... | †21.85 |
| Detroit, del. ..... | 24.16 |
| **Terre Haute,** ovens... | 21.00 |
| **Milwaukee,** ovens .... | 21.15 |
| **Indianapolis,** ovens ... | 20.85 |
| Chicago, del. ..... | 24.19 |
| Cincinnati, del. .... | 23.66 |
| Detroit, del. ..... | 24.61 |
| **Ironton, O.,** ovens ... | 19.40 |
| Cincinnati, del. .... | 21.63 |
| **Painesville, O.,** ovens.. | 20.90 |
| Buffalo, del. ..... | 23.39 |
| Cleveland, del. ..... | 22.55 |
| Erie, del. ..... | 22.67 |
| **Birmingham,** ovens .. | 17.70 |
| **Philadelphia,** ovens ... | 20.55 |
| **Swedeland, Pa.,** ovens. | 20.50 |
| **Portsmouth, O.,** ovens. | 19.50 |
| **Detroit,** ovens ..... | 20.65 |
| Detroit, del. ..... | *21.70 |
| Buffalo, del. ..... | 22.75 |
| Flint, del. ..... | 22.98 |
| Pontiac, del. ..... | 21.98 |
| Saginaw, del. ..... | 23.30 |

Includes representative switching charge of: *, $1.05; †, $1.45.

## Coal Chemicals

Spot, cents per gallon, ovens

(Price effective as of Aug. 5)

| | |
|---|---|
| Pure benzol ..... | 20.00 |
| Toluol, one degree .... | 20.50-26.50 |
| Toluol, two degrees ... | 23.00-26.50 |
| Industrial xylol ..... | 20.50-26.50 |

Per ton bulk, ovens

| | |
|---|---|
| Sulphate of ammonia ..... | $45.00 |

Per pound, ovens

(Effective as of Oct. 1)

| | |
|---|---|
| Phenol, 40 (carlots, returnable drums) .... | 13.50 |
| Do., less than carlots | 14.25 |
| Do., tank cars .... | 12.50 |

(Effective as of Oct. 25)

| | |
|---|---|
| Naphthalene flakes, balls, bbl to jobbers, "household use" .... | 13.75 |

## Refractories

(Prices per 1000 brick, f.o.b. plant)

### Fire Clay Brick

Super Duty: St. Louis, Vandalia, or Farber, Mo., Olive Hill, Ky., Clearfield, or Curwensville, Pa., $100.

High-Heat Duty: Salina, Pa., $85; Woodbridge, N. J., St. Louis, Farber, or Vandalia, Mo., West Decatur, Orviston, Clearfield, Beach Creek, or Curwensville, Pa., Olive Hill, Hitchins, Haldeman, or Ashland, Ky., Troup, or Athens, Tex., Stevens Pottery, Ga., Portsmouth, or Oak Hill, O., $80.

Intermediate-Heat Duty: St. Louis, or Vandalia, Mo., West Decatur, Orviston, Beach Creek, or Clearfield, Pa., Olive Hill, Hitchins, or Haldeman, Ky.; Athens, or Troup, Tex., Stevens Pottery, Ga., or Portsmouth, O., $74.

Low-Heat Duty: Oak Hill, or Portsmouth, O., Clearfield, Pa., Bessemer, Ala., $66.

### Ladle Brick

Dry Press: $55, Freeport, Merill Station, Clearfield, Pa.; Chester, New Cumberland, W. Va.; Irondale, Wellsville, O.

Wire Cut: $53, Chester, New Cumberland, W. Va.; Wellsville, O.

### Malleable Bung Brick

St. Louis, Mo., Olive Hill, Ky., $90; Beach Creek, Pa., $80.

### Silica Brick

Mt. Union, Claysburg, or Sproul, Pa., Ensley, Ala., $80; Hays, Pa. $85; Joliet or Rockdale, Ill., E. Chicago, Ind., $89; Lehi, Utah, Los Angeles, $95.

Eastern Silica Coke Oven Shapes: Claysburg, Mt. Union, Sproul, Pa., Birmingham, $80.

Illinois Silica Coke Oven Shapes: Joliet or Rockdale, Ill., E. Chicago, Ind., Hays, Pa., $81.

### Basic Brick

(Base prices per net ton; f.o.b. works, Baltimore or Chester, Pa.)

Chrome brick or chemical-bonded chrome brick, $69, magnesite brick, $91; chemical-bonded magnesite, $80.

### Magnesite

(Base prices per net ton, f.o.b. works, Chewelah, Wash.)

Domestic dead-burned, ¾" grains; Bulk, $30.50-31.00; single paper bags, $35.00-35.50.

### Dolomite

(Base prices per net ton)

Domestic, dead-burned bulk: Billmeyer, Blue Bell, Williams, Plymouth Meeting, Pa., Millville, W. Va., Narlo, Millersville, Martin, Gibonsburg, Woodville, O., $12.25; Thornton, McCook, Ill., $12.35; Dolly Siding, Bonne Terre, Mo., $12.45.

## Ores

### Lake Superior Iron Ore

*Gross ton, 51½% (natural) Lower Lake Ports*

(Any increase or decrease in R. R. freight rates, dock handling charges and taxes thereon effective after Dec. 31, 1943, are for buyer's account.)

| | |
|---|---|
| Old range bessemer ..... | $7.60 |
| Old range nonbessemer ..... | 7.45 |
| Mesabi bessemer ..... | 7.35 |
| Mesabi nonbessemer ..... | 7.20 |
| High phosphorus ..... | 7.20 |

### Eastern Local Ore

*Cents, units, del. E. Pa.*

Foundry and basic 56.62% concentrates, contract .... 16.00

### Foreign Ore

*Cents per unit, c.i.f. Atlantic ports*

Swedish basic, 60 to 68% .. 15.00
Brazil iron ore, 68-69% ... 19.50

### Tungsten Ore

Wolframite and scheelite per short ton unit, duty paid ..... $26–$28

### Manganese Ore

48-50%, duty paid, f.o.b. cars, New York, Philadelphia, Baltimore, Norfolk, Va., Mobile, Ala., New Orleans, 67.60c-72.60c.

### Chrome Ore

***Gross ton f.o.b. cars, New York, Philadelphia, Baltimore, Charleston, S.C., plus ocean freight differential for delivery to Portland, Oreg., and/or Tacoma, Wash. (S S paying for discharge; dry basis, subject to penalties if guarantees are not met.)***

Indian and African

| | |
|---|---|
| 48% 2.8:1 ..... | $37.50 |
| 48% 3:1 ..... | 39.00 |
| 48% no ratio ..... | 31.00 |

South African (Transvaal)

| | |
|---|---|
| 44% no ratio ..... | $25.50-$26.00 |
| 45% no ratio ..... | 26.50 |
| 48% no ratio ..... | 29.00-30.00 |
| 50% no ratio ..... | 29.50-30.50 |

Brazilian—nominal

| | |
|---|---|
| 44% to 2.5:1 lump ..... | $33.65 |

Rhodesian

| | |
|---|---|
| 45% no ratio ..... | $27-$27.50 |
| 48% no ratio ..... | 30.00 |
| 48% 3:1 lump ..... | 39.00 |

Domestic (seller's nearest rail)

| | |
|---|---|
| 48% 3:1 ..... | $39.00 |

### Molybdenum

Sulphide conc., lb, Mo., cont., Mines ..... $0.75

# WAREHOUSE STEEL PRICES

Prices, cents per pound, for delivery within switching limits, subject to extras.

| | SHEETS | | | STRIP | | BARS | | | | PLATES | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | H-R 10 Ga. | C-R 17 Ga. | Gal. *10 Ga. | †H-R | †C-R | H-R Rds. 5/8" to 3" | C-F Rds. 1/2" & up | H-R Alloy **4140 | Standard Structural Shapes | Carbon 5/8"-3/4" | Floor 5/8" & Thicker |
| Boston (city) | 5.84 | 6.64 | 7.84 | 6.04 | 6.90 | 5.69 | 6.39 | 8.24-9.74 | 5.54 | 5.89 | 7.34 |
| Boston (c'try) | 5.69 | 6.49 | 7.69 | 5.89 | 6.75 | 5.54 | 6.24 | 8.09-9.59 | 5.39 | 5.74 | 7.19 |
| New York (city) | 5.73-5.80 | 6.73 | 7.74-7.83 | 6.08-6.28 | ... | 5.73 | 6.58 | 8.67 | 5.52-5.78 | 5.98 | 7.48 |
| New York (c'try) | 5.53-5.60 | 6.53 | 7.54-7.63 | 5.88-6.08 | ... | 5.53 | 6.38 | ... | 5.32-5.58 | 5.78 | 7.28 |
| Phila. (city) | 5.53-5.89 | 6.64-6.84 | 7.50-7.70 | 5.49-5.84 | ... | 5.60-5.68 | 6.34 | 8.40 | 5.25-5.41 | 5.53-5.66 | 6.76-7.19 |
| Phila. (c'try) | 5.38-5.74 | 6.49-6.69 | 7.35-7.55 | 5.34-5.69 | ... | 5.45-5.53 | 6.19 | 8.25 | 5.10-5.26 | 5.38-5.51 | 6.61-7.04 |
| Balt. (city) | 5.46† | 6.36 | 7.26 | 5.52 | ... | 5.57 | 6.31 | ... | 5.51 | 5.71 | 7.16 |
| Balt. (c'try) | 5.31† | 6.21 | 7.11 | 5.37 | ... | 5.42 | 6.16 | ... | 5.36 | 5.56 | 7.01 |
| Norfolk, Va. | 5.75 | ... | ... | ... | ... | 6.00 | 7.00 | ... | 6.00 | 6.00 | 7.50 |
| Wash. (w'hse) | 5.84-6.00 | ... | ... | 5.90 | ... | 5.91-5.95 | 6.61 | ... | 5.85-5.89 | 6.05-6.09 | 7.50-7.54 |
| Buffalo (del.) | 5.00 | 5.90 | 7.80 | 5.71 | 6.50 | 5.20 | 6.05 | 10.10 | 5.25 | 5.50 | 7.06 |
| Buffalo (w'hse) | 4.85 | 5.75 | 7.65 | 5.56 | 6.35 | 5.05 | 5.90 | 9.95 | 5.10 | 5.35 | 6.91 |
| Pitts. (w'hse) | 4.85-5.00§ | 5.75-5.85[8] | 7.15-7.70 | 5.00-5.35 | 5.95-6.00 | 4.90-5.10 | 5.65 | 7.65 | 4.90-5.15 | 5.05-5.25 | 6.55 |
| Detroit (w'hse) | 4.85-5.00§ | 5.75-5.85[8] | 7.15 | 5.00-5.35 | 5.95-6.00 | 5.45 | 6.17 | 8.12 | 5.45 | 5.65-5.80 | 7.10 |
| Cleveland (del.) | 5.13-5.90‡‡ | 5.90-6.29 | 7.34-8.00‡‡ | 5.17-5.69 | 6.45-6.85 | 5.30-5.35 | 6.05-6.10 | 8.24-8.54 | 5.34-5.60 | 5.50-5.55 | 6.95-7.00 |
| Cleve. (w'hse) | 4.98-5.75 | 5.75-6.14 | 7.19-7.85 | 5.02-5.54 | 6.30-6.70 | 5.15-5.20 | 5.90-5.95 | 8.09-8.39 | 5.19-5.45 | 5.35-5.40 | 6.80-6.85 |
| Cincin. (w'hse) | 5.29 | 6.14 | 7.63 | 5.55 | 6.10 | 5.55 | 6.10 | ... | 5.40 | 5.64 | 6.94 |
| Chicago (city) | 5.00-5.20 | 5.90‡[8] | 7.30 | 5.00 | 6.64-6.80 | 5.05 | 5.85 | 8.25[9] | 5.05 | 5.25 | 6.70 |
| Chicago (w'hse) | 4.85-5.05 | 5.75‡[8] | 7.15 | 4.85 | 6.49-6.65 | 4.90 | 5.70 | 8.10[9] | 4.90 | 5.10 | 6.55 |
| Milwaukee (city) | 5.38 | 6.08‡[8] | 7.48 | 5.18 | 6.82-6.98 | 5.23 | 6.03 | 8.43[9] | 5.23 | 5.43 | 6.88 |
| St. Louis (del.) | 5.34§ | 6.24[8] | 7.44 | 5.34 | 6.64 | 5.39 | 6.19[12] | 6.64 | 5.39 | 5.59 | 7.04 |
| St. L. (w'hse) | 5.19§ | 6.09[8] | 7.29 | 5.19 | 6.49 | 5.24 | 6.04[12] | 9.49 | 5.24 | 5.44 | 6.89 |
| Birm'ham (city) | 5.20§ | ... | 6.60 | 5.20 | ... | 5.15 | 6.66 | ... | 5.15 | 5.40 | 7.41-7.66 |
| Birm'ham (c'try) | 5.05§ | ... | 6.45 | 5.05 | ... | 5.00 | 6.51 | ... | 5.00 | 5.25 | 7.26-7.51 |
| Omaha, Nebr. | 6.07 | ... | 9.33 | 6.07 | ... | 6.12 | 6.92 | ... | 6.12 | 6.32 | 7.77 |
| Los Ang. (city) | 6.55§ | 8.05 | 8.20† | 6.75 | 9.50 | 6.20 | 8.00-8.50 | ... | 6.70 | 6.40 | 8.15 |
| L. A. (w'hse) | 6.40§ | 7.90 | 8.05† | 6.60 | 9.35 | 6.05 | 7.85-8.35 | ... | 6.55 | 6.25 | 8.00 |
| San Francisco | 5.95[21] | 7.15 | 8.05 | 6.75[21] | 8.25[18] | 5.90[21] | 7.55 | 10.20‡‡ | 5.90 | 7.60 | 8.10 |
| Seattle-Tacoma | 6.35[17] | 7.90[5] | 8.40 | 6.70[17] | ... | 6.20[17] | 8.15[1] | 9.45[2] | 6.30[17] | 6.35[17] | 8.40[17] |

Base Quantities: 400 to 1999 lb except as noted: Cold-rolled strip, 2000 lb and over; cold finished bars, 1000 lb and over; galvanized sheets, 450 to 1499 lb; [1]—1500 lb and over; [2]—1000 to 4999 lb; [3]—450 to 39,999 lb; [4]—three to 24 bundles; [5]—450 to 1499 lb; [6]—400 to 14,999 lb; [8]—400 to 1499 lb; [9]—1000 to 1999 lb; [11]—1000 to 39,999 lb; [12]—1000 lb and over; [15]—2000 lb and over; [17]—300 to 999 lb; [18]—1500 to 1999 lb; [19]—1500 to 39,999 lb; [20]—400 to 3999 lb; [21]—400 lb and over; [22]—500 to 1499 lb; [23]—Price (but not other price in range) applies to any and all quantities.

* Includes gage and coating extra, except Birmingham (coating extra excluded); † does not include gage extras; ‡ 15 gage; § 18 gage and heavier; ** as rolled; †† add 0.40 for sizes not rolled in Birmingham; ‡‡ top level of quoted range is nominal.

## Bolts, Nuts

Prices to consumers, f.o.b. midwestern plants. Sellers reserve right to meet competitors' prices, if lower. Additional discounts on carriage and machine bolts, 5 for carloads; 15 for full containers, except tire and plow bolts.

**Carriage and Machine Bolts**

| | |
|---|---|
| ½-in. and smaller ; up to 6 in. in length. | 35 off |
| 9/16 and 5/8 x 6-in. and shorter | 37 off |
| ¾-in. and larger x 6-in. and shorter | 34 off |
| All diameters longer than 6-in. | 30 off |
| Tire bolts | 25 off |
| Plow bolts | 47 off |
| Lag bolts, 6 in. and shorter | 37 off |
| Lag bolts, longer than 6 in. | 35 off |

**Stove Bolts**

In packages, nuts separate, 58½-10 off; bulk 70 off on 15,000 of 3-in. and shorter, or 5000 over 3 in., nuts separate.

**Nuts**

| | A.S. Light | A.S. f.o.b. Reg. and Heavy |
|---|---|---|
| Semifinished hexagon | 41 off | ..... |
| 7/16-in. and smaller | ..... | 38 off |
| ½-in. and smaller | 39 off | ..... |
| 9/16-in.-1-in. | ..... | 37 off |
| 1 1/16-in.-1½-in. | 37 off | 35 off |
| 1 5/8-in. and larger | 34 off | 28 off |

Additional discount of 15 for full containers.

**Hexagon Cap Screws (Packaged)**

| | |
|---|---|
| Upset 1-in. smaller by 6-in. and shorter (1020 bright) | 46 off |
| Upset (1035 heat treated) | |
| 5/8 and smaller x 6 and shorter | 40 off |
| ¾, 7/8, & 1 x 6-in. and shorter | 35 off |

**Square Head Set Screws**

| | |
|---|---|
| Upset 1-in. and smaller | 51 off |
| Headless, ¼-in. and larger | 31 off |

## Rivets

F.o.b. midwestern plants

| | |
|---|---|
| Structural ½-in. and larger | 6.75c |
| 7/8-in. and under | 48 off |

## Washers, Wrought

F.o.b. shipping point, to jobbers. Net to $1 off

# FERROALLOY PRODUCT PRICES

**MANGANESE ALLOYS**

**Spiegeleisen:** (19-21% Mn. 1-3% Si) Carlot per gross ton, $62, Palmerton, Pa.; $66, Pittsburgh and Chicago; (16% to 19% Mn) $1 per ton lower.

**Standard Ferromanganese:** (Mn 78-82%, C 7% approx.) Carload, lump, bulk $160 per gross ton of alloy, c.l., packed, $172; gross ton lots, packed, $187; less gross ton lots, packed, $204; f.o.b. Alloy, W. Va., Niagara Falls, N. Y., or Welland, Ont. Base price; $165, Rockwood, Tenn.; $162, f.o.b. Birmingham and Johnstown, Pa., furnaces; $160, Sheridan, Pa.; $163, Aetna, Pa. Shipment from Pacific Coast warehouses by one seller add $31 to above prices, f.o.b. Los Angeles, San Francisco, Portland, Oreg. Shipment from Chicago warehouse, ton lots, $201; less gross ton lots, $218 f.o.b. Chicago. Add or subtract $2 for each 1%, or fraction thereof, of contained manganese over 82% and under 78%, respectively.

**Low-Carbon Ferromanganese, Regular Grade:** (Mn 80-85%). Carload, lump, bulk, max. 0.10% C, 24.75c per lb of contained Mn, carload packed 25.5c, ton lot 26.6c, less ton 27.8c. Delivered. Deduct 0.5c for max. 0.15% C grade from above prices, 1c for max. 0.30% C, 1.5c for max. 0.50% C, and 4.5c for max. 0.75% C—max. 7% Si. **Special Grade:** (Mn 90% approx., C 0.07% max., P 0.06% max.). Add 0.5c to above prices. Spot, add 0.25c.

**Medium-Carbon Ferromanganese:** (Mn 80-85%, C 1.5% max., Si 1.5% max.). Carload, lump, bulk 18.15c per lb of contained Mn, carload packed 18.9c, ton lot 20.0c, less ton 21.2c. Delivered. Spot, add 0.25c.

**Manganese Metal:** (Mn 96% min., Fe 2% max., Si 1% max., C 0.20% max.). Carload, 2" x D, packed 35.5c per lb of metal, ton lot 37c, less ton 39c. Delivered. Spot, add 2c.

**Manganese, Electrolytic:** Less than 250 lb, 35c; 250 lb to 1999 lb, 32c; 2000 to 35,999 lb, 30c; 36,000 lb or more, 28c. Premium for hydrogen-removed metal 1.5c per pound. F.o.b. cars Knoxville, Tenn., freight allowed to St. Louis or to any point east of Mississippi.

**Silicomanganese:** (Mn 65-68%). Contract, lump, bulk, 1.50% C grade, 18-20% Si, 8.6c per lb of alloy, carload packed, 9.35c, ton lot 10.25c, less ton 11.25c. Freight allowed. For 2% C grade, Si 15-17.5%, deduct 0.2c from above prices. Spot, add 0.25c.

**CHROMIUM ALLOYS**

**High-Carbon Ferrochrome:** Contract, c.l., lump, bulk 20.5c per lb of contained Cr, c.l., packed 21.4c, ton lot 22.55c, less ton 23.95c. Delivered. Spot, add 0.25c.

**"SM" High-Carbon Ferrochrome:** (Cr 60-65%, Si 4-6%, Mn 4-6%, C 4-6%). Add 1.1c to high-carbon ferrochrome prices.

**Foundry Ferrochrome:** (Cr 62-66%, C 5-7%). Contract, c.l., 8MxD, bulk 22.0c per lb of contained Cr, c.l., packed 22.9c, ton 24.25c, less ton 26.0c. Delivered. Spot, add 0.25c.

**Low-Carbon Ferrochrome:** (Cr 67-72%). Contract, carload, lump, bulk, max. 0.03% C 31.65c per lb of contained Cr, 0.04% C 29.75c, 0.06% C 28.75c, 0.10% C 28.25c-28.5c, 0.15% C 28.0c, 0.20% C 27.75c, 0.50% C 27.5c, 1% C 27.25c, 1.50% C 27.1c, 2% C 27.0c. Carload packed add 1.1c, ton lot add 2.2c, less ton add 3.9c. Delivered. Spot, add 0.25c.

**"SM" Low-Carbon Ferrochrome:** (Cr 62-66%, Si 4-6%, Mn 4-6%, C 0.75-1.25% max.). Contract, carload, lump, bulk 27.75c per lb of contained chromium, carload, packed 28.85c, ton lot 30.05c, less ton 31.85c. Delivered. Spot, add 0.25c.

**Low-Carbon Ferrochrome, Nitrogen Bearing:** Add 5c to 0.10% C low-carbon ferrochrome prices for approx. 0.75% N. Add 5c for each 0.25% of N above 0.75%.

**Chromium Metal:** (Min. 97% Cr and 1% Fe). Contract, carload, 1" x D; packed, max. 0.50% C grade, $1.03 per lb of contained chromium, ton lot $1.05, less ton $1.07. Delivered. Spot, add 5c.

(*Please turn to Page 134*)

# Budget Provides for Stockpiling

**President recommends additional appropriation of $310 million for present year and $525 million for 1950. Stocks of copper and lead improve at yearend**

**New York** — President Truman's budget message to Congress last week contained a recommendation of an additional appropriation of $310 million for the present year for stockpiling of critical and strategic materials. An appropriation of $525 million for this purpose was recommended for 1950. Stockpile procurement, the President said, continues to be hampered by shortages of materials and rising prices, since it must meet the competition of current industrial consumption, including that for military purposes.

Of the amounts recommended, $211 million for 1950 and $270 million for 1949 are in contract authorizations to be used primarily for developmental contracts. A total of $800 million in obligatory authority already has been enacted in the last three years.

In addition, materials valued at about $700 million will have been transferred by the end of the fiscal year 1950 to the stockpile from war surplus inventories and from ECA's purchases of strategic materials from the ERP countries. Of the total stockpile objective of $3.7 billion, materials and authorizations amounting to $2.3 billion will have been provided.

Deliveries and expenditures are expected to lag behind authorizations, as in the past. Expenditures in the fiscal year 1950 are estimated at $525 million, an increase of $175 million in outlays over the current year. Materials valued at about $1.6 billion will be on hand at the end of the fiscal year 1950, the message estimated.

The President recommended incentive payments to mineral producers. He recommended a new appropriation of $15 million in 1950 for "incentive payments for exploration and development of minerals."

**Copper** — Due chiefly to the prolonged strike at copper producing facilities in Utah, supplies of the metal continued extremely short last week. Demand from consumers was strong and active at the unchanged price level of 23.50c, Connecticut Valley.

Weakness developed in the red metal scrap market, however, with smelters and refiners lowering their buying prices due to the heavy flow of material. A substantial parts of the heavy shipments early in the year was attributed to efforts of dealers to move material in advance of the rise in freight rates which generally became effective Jan. 11. Refiners were bidding around 20.37-1/2c for No. 1 copper while ingot makers were bidding only about 19.75c. No. 1 composition red brass eased to about 15.87½c.

Refined copper production in the United States in 1948 reached 1,223,697 tons compared with 1,196,393 tons in the previous year. Of this total, 849,815 tons were from domestic ores while of 1947 output 871,391 tons were refined from domestic ores. Domestic deliveries of refined copper were 1,344,445 tons compared with 1,383,666 tons 1947. Refined output in December totaled 96.117 tons against 102,779 tons in November, while deliveries were 102,292 tons compared with 99.655 tons in the previous month. Stocks in United States Dec. 31 were 96,080 tons, an increase of 6324 tons over the 89,756 tons on Nov. 30. Stocks at close of 1947 were 76,035 tons.

Production of refined copper outside of the United States last year totaled 1,072,229 tons against 1,016,836 tons in 1947.

**Lead** — Sales of lead for January shipment have exceeded those reported for December, which represented the largest tonnage in more than 1-1/2 years. The increase in available supplies is attributed to the high rate of domestic production which has been unhampered recently by labor difficulties and to increased imports of foreign metal.

Imports of refined lead during November totaled 21.266 tons, or a decline of about 5600 tons from October due to the longshoremen's strike. Total for the first 11 months was 211,788 tons, or about 73,200 tons more than in the like 1947 period.

Stocks of lead held by smelters and refiners as of Dec. 1 amounted to 130,606 tons compared with 125,659 tons a month earlier, 114,272 tons on Oct. 1, and 134.252 tons as of Dec. 1, 1947, according to the American Bureau of Metal Statistics. The rise in total stocks on Dec. 1 was due to an increase in tonnage of refined lead on hand to 23,393 tons from 16,675 tons as of Nov. 1. Stocks in ore and matte and in process at smelteries on Dec. 1 declined to 64,318 tons from 66,481 tons a month earlier, while stocks in base bullion in transit to refineries increased to 6123 tons from 5655 tons on Nov. 1.

Stocks of antimonial lead as of Dec. 1 totaled 10,799 tons and compared with 10,878 tons as of Nov. 1.

**Zinc** — Production of slab zinc increased 5751 tons during December to 76,946 tons, the largest total recorded since May, 1944, according to the American Zinc Institute. This brought output for the year to 850,355 tons compared with 848,027 tons in 1947 and to the highest level since 1944. The daily average production in 1948 was exactly the same as for the previous year, or 2323 tons.

Shipments of zinc to domestic consumers increased to 68,246 tons in December from 66,211 tons in November, bringing the total for the year to 770,646 tons against 698,281 tons in 1947. Export and drawback shipments increased to 5684 tons from 3636 tons in November, making the total for the year 69,910 tons against 117,305 tons in 1947. Only 1652 tons were transferred to the government's account, making the 1948 total 57,598 tons against 140,230 tons in 1947 and 62,007 tons in 1946.

Despite the rise in domestic and export shipments during December, the increase in smelter output resulted in an increase of 1364 tons in stocks, to a total of 20,848 tons compared with 68,011 tons at the close of 1947.

After declining steadily since last April, unfilled orders on the books of smelters on Dec. 31 totaled 51,318 tons, an increase of about 7500 tons over the previous month's total of 43,788 tons.

With stocks equivalent to less than 10 days' requirements, offerings of domestic metal are limited and far below consumers' requests. Prices held firm last week on the basis of 17.50c, East St. Louis, and 18.00c, f.a.s. Gulf ports, for prime western.

**Tin** — Production of tin concentrates in the Netherlands East Indies amounted to the equivalent of 3038 tons of fine tin in December, making total output for last year 30,561 tons. This compares with only 15,915 tons for 1947. Production in that district was runing at an annual rate of 36,000 tons at the yearend against 21,000 tons at the end of 1947. It is expected that production in 1949 will approximate 40,000 tons.

Shipments of Straits tin from Malaya amounted to 1753 tons in December, making the total for the year 47,194 tons compared with 29.889 tons in 1947. No shipments were made to the United States in December compared with 797 tons in November and 2150 tons in October. As soon as the Combined Tin Committee announces the first interim allocations for the first half of 1949, the purchases and shipments of Straits tin are likely to be resumed on an active scale.

Output of refined tin by the Longhorn tin smelter in December amounted to 3153 tons, making the total for the year 36,666 tons compared with 33,292 tons in 1947 and 43,468 tons in 1946, the record year.

Undertone of the market remains firm on the basis of $1.03 for Straits tin.

**Aluminum**—Several leading smelters of remelt aluminum ingots have reduced prices ½-cent a pound on most grades due to a lull in buying interest and heavier offerings of scrap.

## Chemical Output Sets Record

**New York** — Industrial chemical production in the United States in 1948 reached an all-time peak, estimated at more than $3 billion, according to the American Chemical Society. This represents an increase of at least 10 per cent over the 1947 total. During the first nine months of the year, the Federal Reserve Board index of industrial chemical production averaged 440 per cent of the 1935-1939 figure compared with the wartime record of 412 in 1945. The Bureau of Labor Statistics wholesale price index for industrial chemicals in September, 1948, was 126 compared with 168.5 for all commodities (taking the 1926 level as 100). This represents an increase of only 7.8 points for chemicals as against 11.1 points for all commodities.

# NONFERROUS METAL PRICES

(Cents per pound, carlots, except as otherwise noted)

**Copper:** Electrolytic, 23.50c, Conn. Valley; Lake, 23.62½c, Conn. Valley.

**Brass Ingot:** 85-5-5-5 (No. 115) 21.00-22.00c; 88-10-2 (No. 215) 31.00c; 80-10-10 (No. 305) 27.25c; No. 1 yellow (No. 405) 17.25-17.50c.

**Zinc:** Prime western 17.50c, brass special 17.75c, intermediate 18.00c, East St. Louis; high grade 18.50c, delivered.

**Lead:** Common 21.30-21.35c, chemical and corroding 21.40c, St. Louis.

**Primary Aluminum:** 99% plus, ingots 17.00c, pigs 16.00c. Base prices for 10,000 lb and over, f.o.b. shipping point, freight allowed.

**Secondary Aluminum:** Piston alloy (No. 122 type) 26.00-26.50c; No. 12 foundry alloy (No. 2 grade) 25.25-25.75c; steel deoxidizing grades, notch bars, granulated or shot: Grade 1, 27.50-28.00c; grade 2, 26.25-26.75c; grade 3, 25.25-25.75c; grade 4, 24.75-25.25c. Prices include freight at carload rate up to 75 cents per 100 lb.

**Magnesium:** Commercially pure (99.8%) standard ingots, 10,000 lb. and over, 20.50c, f.o.b. Freeport, Tex.

**Tin:** Grade A, 99.8% or higher (including Straits) $1.03; grade B, 99.8% or higher, not meeting specifications for grade A, with 0.05% max. arsenic, $1.028; grade C, 99.65-99.79%, incl., $1.024; 99.5-99.649% $1.024, grade F, 98-98.999% $1.015 for tin content. Prices are ex-dock, New York, in 5-ton lots.

**Antimony:** American 99-99.8% and over but not meeting specifications below, 38.50c; 99.8% and over (arsenic 0.05% max.; other impurities, 0.1% max.) 39.00c, f.o.b. Laredo, Tex., for bulk shipments.

**Nickel:** Electrolytic cathodes, 99.9%, base sizes at refinery, unpacked, 40.00c; 25-lb pigs, 42.50c; shot nom.; "XX" nickel shot, 43.50c; "F" nickel shot or ingots, for addition to cast iron, 40.50c. Prices include import duty.

**Mercury:** Open market, spot, New York $90-$97 per 76-lb flask.

**Beryllium-Copper:** 3.75-4.25% Be, $24.50 per lb contained Be.

**Cadmium:** "Regular" straight or flat forms, $2 del.; special or patented shapes, $2.10.

**Cobalt:** 97-98%, $1.65 per lb for 550 lb (keg); $1.67 per lb for 100 lb (case); $1.72 per lb under 100 lb.

**Gold:** U. S. Treasury, $35 per ounce.

**Silver:** Open market, New York, 70.00c per ounce.

**Platinum:** $88-$92 per ounce.

**Palladium:** $24 per troy ounce.

**Iridium:** $110-$115 per troy ounce.

**Titanium (sponge form):** $5 per pound.

## Rolled, Drawn, Extruded Products

### COPPER AND BRASS

(Base prices, cents per pound, f.o.b. mill)

**Sheet:** Copper 37.18; yellow brass 34.59; commercial bronze, 95%, 37.23; 90%, 36.88; red brass, 85%, 36.01; 80%, 35.66; best quality, 35.33; nickel silver, 18%, 46.92; phosphor-bronze, grade A, 5%, 56.05.

**Rods:** Copper, hot rolled 33.28; cold drawn 34.28; yellow brass, free cutting, 38.16; commercial bronze, 95% 36.92; 90% 36.57; red brass, 85% 35.70; 80% 35.35.

**Seamless Tubing:** Copper 37.22; yellow brass 37.60; commercial bronze 90% 39.54; red brass 85% 38.92; 80% 38.57.

**Wire:** Yellow brass 34.88; commercial bronze, 95% 37.52; 90% 37.17; red brass, 85% 36.30; 80% 35.95; best quality brass 35.62.

**Copper Wire:** Bare, soft, f.o.b. eastern mills, c.l. 29.42½c, l.c.l. 29.92½-30.05c; weatherproof, f.o.b. eastern mills, c.l. 29.60-29.85c, l.c.l. 30.35c; magnet, delivered, c.l. 32.75-33.50c, 15,000 lb or more 33.00-33.75c, l.c.l. 33.50-34.25c.

### ALUMINUM

**Sheets and Circles:** 2S and 3S mill finish c.l.

| Thickness Range, Inches | Widths or Diameters, In., Incl. | Flat Sheet Base* | Coiled Sheet Base | Coiled Sheet Circle† Base |
|---|---|---|---|---|
| 0.249-0.136 | 12-48 | 26.9 | ... | ... |
| 0.135-0.096 | 12-48 | 27.4 | ... | ... |
| 0.095-0.077 | 12-48 | 27.9 | 26.0 | 29.6 |
| 0.076-0.068 | 12-48 | 28.5 | 26.2 | 29.8 |
| 0.067-0.061 | 12-48 | 28.5 | 26.2 | 29.8 |
| 0.060-0.048 | 12-48 | 28.7 | 26.4 | 30.1 |
| 0.047-0.038 | 12-48 | 29.1 | 26.6 | 30.4 |
| 0.037-0.030 | 12-48 | 29.5 | 27.0 | 30.9 |
| 0.029-0.024 | 12-48 | 29.9 | 27.3 | 31.3 |
| 0.023-0.019 | 12-36 | 30.5 | 27.7 | 31.8 |
| 0.018-0.017 | 12-36 | 31.1 | 28.3 | 32.6 |
| 0.016-0.015 | 12-36 | 31.8 | 28.9 | 33.5 |
| 0.014 | 12-24 | 32.7 | 29.7 | 34.6 |
| 0.013-0.012 | 12-24 | 33.6 | 30.4 | 35.5 |
| 0.011 | 12-24 | 34.6 | 31.3 | 36.7 |
| 0.010-0.0095 | 12-24 | 35.6 | 32.3 | 38.0 |
| 0.009-0.0085 | 12-20 | 36.8 | 33.4 | 39.5 |
| 0.008-0.0075 | 12-20 | 38.1 | 34.6 | 41.1 |
| 0.007 | 12-18 | 39.5 | 35.9 | 42.9 |
| 0.006 | 12-18 | 41.0 | 37.2 | 47.0 |

* Minimum length, 60 inches. † Maximum diameter, 24 inches.

**Screw Machine Stock:** 5000 lb and over.

| Diam. (in.) or distance across flats | —Round— R317-T4, 17S-T4 | R317-T4 | —Hexagonal— 17S-T4 |
|---|---|---|---|
| 0.125 | 48.0 | ... | ... |
| 0.156-0.203 | 41.0 | ... | ... |
| 0.219-0.313 | 38.0 | ... | ... |
| 0.344 | 37.0 | ... | 47.0 |
| 0.375 | 36.5 | 45.5 | 44.0 |
| 0.406 | 36.5 | ... | ... |
| 0.438 | 36.5 | 45.5 | 44.0 |
| 0.469 | 36.5 | ... | ... |
| 0.500 | 36.5 | 45.5 | 44.0 |
| 0.531 | 36.5 | ... | ... |
| 0.563 | 36.5 | ... | 41.5 |
| 0.594 | 36.5 | ... | ... |
| 0.625 | 36.5 | 43.0 | 41.5 |
| 0.656 | 36.5 | ... | ... |
| 0.688 | 36.5 | ... | 41.5 |
| 0.750-1.000 | 35.5 | 40.5 | 39.0 |
| 1.063 | 35.5 | ... | 37.5 |
| 1.125-1.500 | 34.5 | 39.0 | 37.5 |
| 1.563 | 34.5 | ... | 37.5 |
| 1.625 | 33.5 | ... | 36.5 |
| 1.688-2.000 | 33.5 | ... | ... |
| 2.125-2.500 | 32.5 | ... | ... |
| 2.625-3.375 | 31.5 | ... | ... |

### LEAD

(Prices to jobbers, f.o.b. Cleveland, Pittsburgh) Sheets: Full rolls, 140 sq ft or more, $27.25 per cwt.; add 50c per cwt., 10 sq ft to 140 sq ft. Pipe: Full coils, $27.25 per cwt; cut coils, $27.50. Traps and Bends: List price plus 80%.

### ZINC

Sheets, 22.00-22.50c, f.o.b. mill, 36,000 lb and over. Ribbon zinc in coils, 20.75-21.50c, f.o.b. mill, 36,000 lb and over. Plates, not over 12-in., 19.75-20.50c; over 12-in., 20.75-21.50c.

### NICKEL

(Base prices, f.o.b. mill)

Sheets, cold-rolled, 60.00c. Strip, cold-rolled 66.00c. Rods and shapes, 56.00c. Plates 58.00c. Seamless tubes, 89.00c.

### MONEL

(Base prices, f.o.b. mill.)

Sheets, cold-rolled 47.00c; Strip, cold-rolled, 50.00c. Rods and shapes, 45.00c. Plates, 46.00c. Seamless tubes, 80.00c. Shot and blocks, 40.00c.

### MAGNESIUM

Extruded Rounds, 12 in. long, 1.312 in. in diameter, less than 25 lb. 52.00-56.00c; 25 to 99 lb, 42.00-46.00c; 100 lb to 4000 lb., 35.00-36.00c.

## Plating Materials

**Chromic Acid:** 99.9%, flake, f.o.b. Philadelphia, carloads, 26.00c; 5 tons and over 26.50c; 1 to 5 tons, 27.00c; less than 1 ton, 27.50c.

**Copper Anodes:** Base, 2000 to 5000 lb; f.o.b. shipping point, freight allowed: Flat untrimmed 33.84c; oval 33.34c; electrodeposited, 31.09c; cast, 30.12c.

**Copper Cyanide:** 70-71% Cu, 100-lb drums, 46.00c, f.o.b. Niagara Falls, N. Y..

**Sodium Cyanide:** 96-98%, ½-oz ball, in 200 lb drums, 1 to 900 lb, 16.00c; 1000 to 19,900 lb, 15.00c, f.o.b. Niagara Falls, N. Y.

**Copper Carbonate:** 54-56% metallic Cu; 50 lb bags, up to 250 lb, 26.25c; over 250 lb, 25.25c, f.o.b. Cleveland.

**Nickel Anodes:** Rolled oval, carbonized, carloads, 56.00c; 10,000 to 30,000 lb. 57.00c; 3000 to 10,000 lb, 58.00c; 500 to 3000 lb, 59.00c; 100 to 500 lb, 61.00c; under 10 lb, 64.00c; f.o.b. Cleveland. Add 1 cent for rolled depolarized.

**Nickel Chloride:** 100-lb kegs, 26.50c; 275-lb, or 500-lb bbl, 24.50c, f.o.b. Cleveland, freight allowed on barrels, or 3 or more kegs.

**Tin Anodes:** Bar, 1000 lb and over 119.00c; 500 to 999 lb, 119.50c; 200 to 499 lb, 120.00c; less than 200 lb, 121.50c; ball, 1000 lb and over, 121.25c; 500 to 999 lb, 121.75c; 200 to 499 lb, 122.25c; less than 200 lb, 123.75c f.o.b. Sewaren, N. J.

**Sodium Stannate:** 25 lb cans only, less than 100 lb, to consumers 71.8c; 100 or 300 lb drums only, 100 to 500 lb, 63.6c; 600 to 1900 lb. 61.2c; 2000 to 9900 lb, 59.4c. Prices f.o.b. Sewaren, N. J. Freight not exceeding St. Louis rate allowed. F.o.b. Carteret, N. J., prices are 0.3c lower.

**Zinc Cyanide:** 100-lb drums 39.25c, f.o.b. Cleveland; 39.00c, Detroit; 38.00c, f.o.b. Philadelphia.

**Stannous Sulphate:** Less than 2000 lb in 100 lb kegs, 100.00c, in 400 lb bbl, 99.00c; more than 2000 lb, in 100 lb kegs, 99.00c, in 400 lb bbl, 98.00c, f.o.b. Carteret, N. J.

**Stannous Chloride** (anhydrous): In 400 lb bbl, 97.00c; in 100 lb kegs, 98.00c, f.o.b. Carteret, N. J.

## Scrap Metals

### BRASS MILL ALLOWANCES

Prices in cents per pound for less than 15,000 lb f.o.b. shipping point.

| | Clean Heavy | Rod Ends | Clean Turnings |
|---|---|---|---|
| Copper | 21.125 | 21.125 | 20.375 |
| Yellow brass | 18.875 | 18.625 | 18.125 |
| Commercial Bronze | | | |
| 95% | 20.250 | 20.000 | 19.500 |
| 90% | 20.125 | 19.875 | 19.375 |
| Red brass | | | |
| 85% | 20.000 | 19.750 | 19.250 |
| 80% | 19.875 | 19.625 | 19.125 |
| Best Quality (71-79%) | 19.750 | 19.500 | 19.000 |
| Muntz Metal | 18.250 | 18.000 | 17.500 |
| Nickel, silver, 10% | 20.250 | 20.000 | 10.000 |
| Phos. bronze, A | 22.625 | 22.375 | 21.375 |
| Naval brass | 18.750 | 18.500 | 18.000 |
| Manganese bronze | 18.750 | 18.500 | 17.875 |

### BRASS INGOT MAKERS BUYING PRICES

(Cents per pound, f.o.b. shipping point, carload lots)

No. 1 copper 19.50-20.00, No. 2 copper 18.50-19.00, light copper 17.50-18.00, composition red brass 15.75-16.00, auto radiators 13.75, heavy yellow brass 11.75-12.00.

### REFINERS' BUYING PRICES

(Cents per pound, delivered refinery, carload lots)

No. 1 copper 20.25-20.50, No. 2 copper 19.25-19.50, light copper 18.25-18.50, refinery brass (60% copper), per dry copper content 18.37½-18.62½.

### DEALERS' BUYING PRICES

(Cents per pound, New York, in ton lots or more)

**Copper and Brass:** Heavy copper and wire No. 1 18.50-19.00, No. 2 17.50-18.00, light copper 16.50-17.00, No. 1 composition red brass 14.50-15.00, No. 1 composition turnings 14.00-14.50, mixed brass turnings 8.75-9.00, new brass clippings 15.75-16.25, No. 1 brass rod turnings 12.75-13.25, light brass 8.75-9.25, heavy yellow brass 11.00-11.25, new brass rod ends 13.25-13.75, auto radiators, unsweated 12.75-13.00, cocks and faucets 12.25-12.50, brass pipe 12.75-13.25.

**Lead:** Heavy 18.50-19.00, battery plates 13.00-13.25, linotype and stereotype 19.50-20.00, electrotype 18.50-19.00, mixed babbitt 19.50-20.00, solder joints, 23.00-24.00.

**Zinc:** Old zinc 10.00-10.50, new die cast scrap 9.50-10.00, old die cast scrap 6.75-7.25.

**Tin:** No. 1 pewter 65.00-67.00, block tin pipe 83.00-84.00, No. 1 babbitt 51.00-54.00, siphon tops 50.00-52.00.

**Aluminum:** Clippings 2S 16.50-17.00, old sheets 13.00-13.50, crankcase 13.00-13.50, borings and turnings 6.50-7.00, pistons, free of struts, 13.00-13.50.

## DAILY PRICE RECORD

| | Copper | Lead | Zinc | Tin | Aluminum | Antimony | Nickel | Silver |
|---|---|---|---|---|---|---|---|---|
| Nov. Avg. .... | 23.50 | 21.325 | 16.580 | 103.00 | 17.00 | 38.50 | 40.00 | 73.655 |
| Dec. Avg. .... | 23.50 | 21.325 | 17.50 | 103.00 | 17.00 | 38.50 | 40.00 | 70.00 |
| Jan. 3-13 ..... | 23.50 | 21.30–21.35 | 17.50 | 103.00 | 17.00 | 38.50 | 40.00 | 70.00 |

NOTE: Copper: Electrolytic, del. Conn. Valley; Lead, common grade, del. E. St. Louis; Zinc, prime western, del. St. Louis; Tin, Straits, del. New York; Aluminum, primary ingots, 99%, del.; Antimony, bulk, f.o.b. Laredo, Tex.; Nickel, electrolytic cathodes, 99.9%, base sizes at refinery, unpacked; Silver, open market, New York. Prices, cents per pound; except silver, cents per ounce.

# OPEN MARKET PRICES, IRON AND STEEL SCRAP

Prices are dollars per gross ton, including broker's commission, delivered at consumer's plant except where noted.

### PITTSBURGH

| | |
|---|---|
| No. 1 Hvy. Melt (industrial) | $42.50-43.00 |
| No. 2 Hvy. Melt (industrial) | 42.50-43.00 |
| No. 2 Hvy. Melt (dealer) | 40.50-41.00 |
| No. 1 Busheling (industrial) | 42.50-43.00 |
| No. 1 Bundles (indus.) | 43.00 |
| Nos. 1, 2 Bundles (dealer) | 41.00 |
| No. 3 Bundles | 39.00 |
| Machine Shop Turnings | 36.50-37.00 |
| Mixed Borings, Turnings | 36.50-37.00 |
| Short Shovel Turnings | 38.00 |
| Cast Iron Borings | 37.50-38.00 |
| Bar Crops and Plate | 49.00-50.00 |
| Low Phos. Steel | 49.00-50.00 |
| Heavy Turnings | 39.00-40.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola | 61.00-62.00§ |
| Machinery Cast | 67.00-68.00§ |
| Charging Box Cast | 57.00-58.00§ |
| Heavy Breakable Cast | 56.00-57.00§ |
| Malleable | 70.00-71.00§ |
| Brake Shoe | 53.50-54.00§ |

Railroad Scrap*

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 43.50-44.00 |
| R.R. Malleable | 75.00-80.00 |
| Axles | 55.25-56.25 |
| Rails, Rerolling | 59.00-60.00 |
| Rails, Random Lengths | 55.00-56.00 |
| Rails, 3 ft and under. | 58.00-59.00 |
| Rails, 18 in. and under | 60.00-61.00 |
| Railroad Specialties | 56.00-57.50 |
| Uncut Tires | 55.00-56.00 |
| Angles, Splice Bars | 57.00-58.00 |

* Current bid prices. § Nominal.

### CLEVELAND

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $40.00-40.50 |
| No. 2 Heavy Melt. Steel | 40.00-40.50 |
| No. 1 Busheling | 40.00-40.50 |
| Nos. 1 & 2 Bundles | 40.00-40.50 |
| Machine Shop Turnings | 32.00-32.50 |
| Mixed Borings, Turnings | 34.00-34.50 |
| Short Shovel Turnings | 34.50-35.00 |
| Cast Iron Borings | 34.00-34.50 |
| Bar Crops and Plate | 45.00-45.50 |
| Punchings & Plate Scrap | 45.00-45.50 |
| Heavy Turnings | 40.00-40.50 |
| Alloy Free Turnings | 37.00-37.50 |
| Cut Structurals | 46.00-46.50 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola | 66.00-66.50 |
| Charging Box Cast | 58.00-58.50 |
| Stove Plate | 58.00-58.50 |
| Heavy Breakable Cast. | 53.00-53.50 |
| Unstripped Motor Blocks | 53.00-53.50 |
| Malleable | 73.00-73.50 |
| Brake Shoes | 53.00-53.50 |
| Clean Auto Cast | 68.00-68.50 |
| No. 1 Wheels | 61.00-61.50 |
| Burnt Cast | 53.00-53.50 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 43.00-44.00 |
| R.R. Malleable | 73.00-75.00 |
| Rails, Rerolling | 60.00-66.00 |
| Rails, Random Lengths | 56.00-58.00 |
| Rails, 3 ft and under. | 61.00-63.50 |
| Cast Steel | 53.00-54.00 |
| Railroad Specialties | 53.00-55.00 |
| Uncut Tires | 51.00-53.00 |
| Angles, Splice Bars | 58.00-60.00 |

### VALLEY

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $40.50-41.00 |
| No. 2 Heavy Melt. Steel | 40.50-41.00 |
| No. 1 Bundles | 40.50-41.00 |
| Machine Shop Turnings | 35.00-35.50 |
| Short Shovel Turnings. | 36.00-37.00 |
| Cast Iron Borings | 35.00-36.00 |
| Low Phos. | 46.00-48.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 43.00-44.00 |

### MANSFIELD

| | |
|---|---|
| Machine Shop Turnings | $37.50-38.00 |
| Short Shovel Turnings | 39.50-40.00 |

### CINCINNATI

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $38.40 |
| No. 2 Heavy Melt. Steel | 38.40 |
| No. 1 Busheling | 38.40 |
| Nos. 1 & 2 Bundles | 38.40 |
| Machine Shop Turnings | 33.40 |
| Mixed Borings, Turnings | 33.40 |
| Short Shovel Turnings. | 35.40 |
| Cast Iron Borings | 34.40 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 63.00 |
| Charging Box Cast | 56.00 |
| Heavy Breakable Cast. | 55.00 |
| Stove Plate | 53.00 |
| Unstripped Motor Blocks | 53.00 |
| Brake Shoes | 50.00 |
| Clean Auto Cast | 63.00 |
| Drop Broken Cast | 68.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 42.00 |
| R.R. Malleable | 72.00 |
| Rails, Rerolling | 58.00 |
| Rails, Random Lengths | 56.00 |
| Rails, 18 in. and under | 62.00 |

### DETROIT

(Brokers' buying prices, f.o.b. shipping point)

| | |
|---|---|
| **No. 1 Heavy Melt. Steel** | **$37.50-38.00** |
| **No. 1 Busheling** | **37.50-38.00** |
| **Nos. 1 & 2 Bundles** | **37.50-38.00** |
| **No. 3 Bundles** | **37.50-38.00** |
| **Machine Shop Turnings** | **31.50-32.00** |
| **Mixed Borings, Turnings** | **31.50-32.00** |
| **Short Shovel Turnings.** | **32.50-33.00** |
| **Cast Iron Borings** | **32.50-33.00** |
| **Punchings & Plate Scrap** | **42.50-43.00** |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 60.00-65.00 |
| Heavy Breakable Cast. | 54.00-59.00 |
| Clean Auto Cast | 60.00-65.00 |

### BUFFALO

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $46.00-48.00 |
| No. 2 Heavy Melt. Steel | 39.75-40.25 |
| No. 1 Busheling | 39.75-40.25 |
| Nos. 1 & 2 Bundles | 39.75-40.25 |
| Machine Shop Turnings | 37.50-38.50 |
| Mixed Borings, Turnings | 37.50-38.50 |
| Cast Iron Borings | 37.50-38.50 |
| Short Shovel Turnings. | 38.50-39.00 |
| Low Phos. | 47.00-48.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola | 62.00-63.00 |
| Mixed Cupola | 60.00-60.50 |
| Heavy Breakable Cast. | 55.00-57.00 |
| Malleable | 70.00-75.00 |
| Clean Auto Cast | 70.00-72.00 |

Railroad Scrap

| | |
|---|---|
| Rails, 3 ft. and under. | 59.00-61.00 |
| Railroad Specialties | 56.00-57.00 |

### PHILADELPHIA

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $43.00-43.50 |
| No. 2 Heavy Melt. Steel | 39.50 |
| No. 1 Busheling | 39.50 |
| Nos. 1 & 2 Bundles | 39.50 |
| No. 3 Bundles | nom. |
| Machine Shop Turnings | 34.00-35.00 |
| Mixed Borings, Turnings | 34.00-35.00 |
| Short Shovel Turnings. | 36.00-37.00 |
| Bar Crop and Plate | 48.00-49.00 |
| Punchings & Plate Scrap | 48.00-49.00 |
| Cut Structurals | 48.00-49.00 |
| Elec. Furnace Bundles. | 46.00-47.00 |
| Heavy Turnings | 44.50-45.50 |
| No. 1 Chemical Borings | 41.00-41.50 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 56.00-57.00 |
| No. 1 Machinery Cast. | 60.00-61.00 |
| Charging Box Cast | 55.00-56.00 |
| Heavy Breakable Cast. | 55.00-56.00 |
| Unstripped Motor Blocks | 53.50-54.50 |
| Clean Auto Cast | 56.00-57.00 |
| No. 1 Wheels | 60.00-61.00 |

### NEW YORK

(Brokers' buying prices f.o.b. shipping point)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $36.00-36.50 |
| No. 2 Heavy Melt. Steel | 34.00 |
| No. 1 Busheling | 34.00 |
| Nos. 1 & 2 Bundles | 34.00 |
| No. 3 Bundles | 32.00 |
| Machine Shop Turnings | 29.00 |
| Mixed Borings, Turnings | 29.00 |
| Short Shovel Turnings. | 30.00 |
| Punching & Plate Scrap | 41.00-42.00 |
| Cut Structurals | 41.00-42.00 |
| Elec. Furnace Bundles. | 41.00-42.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 49.00 |
| Charging Box Cast | 49.00 |
| Heavy Breakable | 48.00 |
| Unstripped Motor Blocks | 46.50 |
| Malleable | 66.00-67.00 |

### BOSTON

(F.o.b. shipping point)

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $35.00 |
| No. 2 Heavy Melt. Steel | 31.90 |
| No. 1 Bundles | 31.90 |
| No. 1 Busheling | 31.90 |
| Machine Shop Turnings | 26.90 |
| Mixed Borings, Turnings | 26.90 |
| Short Shovel Turnings. | 28.90 |
| Bar Crops and Plate | 37.50-38.50 |
| Punching & Plate Scrap | 37.50-38.50 |
| Chemical Borings | 36.00-37.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 55.00-56.00 |
| Heavy Breakable Cast. | 47.00-48.00 |
| Stove Plate | 50.00-52.00 |
| Unstripped Motor Blocks | 46.00-48.00 |
| Clean Auto Cast | 50.00-52.00 |

### CHICAGO

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $39.50-40.00 |
| No. 2 Heavy Melt. Steel | 39.50-40.00 |
| No. 1 Bundles | 39.50-40.00 |
| No. 2 Bundles | 39.50-40.00 |
| No. 3 Bundles | 39.50-40.00 |
| Machine Shop Turnings | 34.50-35.00 |
| Mixed Borings, Turnings | 34.50-35.00 |
| Short Shovel Turnings. | 36.50-37.00 |
| Cast Iron Borings | 35.50-36.00 |
| Bar Crops and Plate | 45.00-46.00 |
| Punchings | 45.00-46.00 |
| Elec. Furnace Bundles. | 44.00-45.00 |
| Heavy Turnings | 40.50-41.00 |
| Cut Structurals | 44.50-45.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 63.00-64.00 |
| Clean Auto Cast | 63.00-64.00 |
| No. 1 Wheels | 58.00-60.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 43.00-44.00 |
| Malleable | 76.00-77.00 |
| Rails, Rerolling | 59.00-60.00 |
| Rails Random Lengths | 49.00-50.00 |
| Rails, 3 ft. and under. | 56.00-57.00 |
| Rails, 18 in. and under | 59.00-60.00 |
| Railroad Specialties | 47.00-48.00 |
| Angles, Splice Bars | 52.50-54.00 |

### ST. LOUIS

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $44.00-45.00 |
| No. 2 Heavy Melt. Steel | 40.00-41.00 |
| Machine Shop Turnings | 35.00-36.00 |
| Short Shovel Turnings. | 36.50-37.50 |

Cast Iron Grades (F.o.b. shipping point)

| | |
|---|---|
| No. 1 Cupola Cast | 63.00-65.00 |
| Mixed Cast | 56.00-58.00 |
| Heavy Breakable Cast. | 59.00-60.00 |
| Brake Shoes | 58.00-59.00 |
| Clean Auto Cast | 65.00-67.00 |
| Burnt Cast | 59.00-60.00 |

Railroad Scrap

| | |
|---|---|
| R.R. Malleable | 71.00-72.00 |
| Rails, Rerolling | 63.00-65.00 |
| Rails, Random Lengths | 56.00-59.00 |
| Rails, 3 ft. and under. | 60.00-61.00 |
| Uncut Tires | 51.00-52.00 |
| Angles, Splice Bars | 54.00-56.00 |

### BIRMINGHAM

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $39.50 |
| No. 2 Heavy Melt. Steel | 39.50 |
| No. 1 Busheling | 39.50 |
| Nos. 1 & 2 Bundles | 39.00 |
| No. 3 Bundles | 37.00 |
| Long Turnings | 24.50 |
| Short Shovel Turnings. | 26.00-27.00 |
| Cast Iron Borings | 25.00 |
| Bar Crops and Plate | 40.00 |
| Cut Structurals | 38.50 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | nom. |
| Stove Plate | 60.00-62.00 |
| No. 1 Wheels | 59.00-61.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 38.00 |
| R.R. Malleable | nom. |
| Axles, Steel | 50.00 |
| Rails, Rerolling | 53.00-55.00 |
| Rails, Random Lengths | 45.00-48.00 |
| Rails, 3 ft. and under. | 53.00-55.00 |
| Angles and Splice Bars | 52.00-53.00 |

### SAN FRANCISCO

| | |
|---|---|
| No. 1 Heavy Melt. Steel | *$27.50 |
| No. 2 Heavy Melt. Steel | *27.50 |
| No. 1 Busheling | *27.50 |
| Nos. 1 & 2 Bundles | *27.50 |
| No. 3 Bundles | *24.50 |
| Machine Shop Turnings | *18.00 |
| Bar Crops and Plate | *27.50 |
| Cast Steel | *27.50 |
| Alloy Free Turnings | *18.00 |
| Cut Structurals | *27.50 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 50.00-65.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 Heavy Melting | *28.50 |
| Axles | *34.00 |
| Rails, Random Lengths | *29.00 |

*F.o.b. California shipping point.

### SEATTLE

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $29.00-30.00 |
| No. 2 Heavy Melt. Steel | 29.00-30.00 |
| No. 1 Busheling | 29.00-30.00 |
| Nos. 1 & 2 Bundles | 29.00-30.00 |
| No. 3 Bundles | 24.50 |
| Machine Shop Turnings | 21.00-22.50 |
| Mixed Borings, Turnings | 21.00-22.50 |
| Punching & Plate Scrap | 35.00 |
| Cut Structurals | 26.00-28.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | 50.00 |
| Heavy Breakable Cast | 35.00 |
| Stove Plate | 30.00 |
| Unstripped Motor Blocks | 32.50 |
| Malleable | 40.00 |
| Brake Shoes | 35.00 |
| Clean Auto Cast | 40.00 |
| No. 1 Wheels | 37.50-40.00 |

Railroad Scrap

| | |
|---|---|
| No. 1 R.R. Heavy Melt. | 28.50 |
| Railroad Malleable | 30.00 |
| Rails, Random Lengths | 30.00-32.00 |
| Angles and Splice Bars | 28.50 |

### LOS ANGELES

| | |
|---|---|
| No. 1 Heavy Melt. Steel | $27.50 |
| No. 2 Heavy Melt. Steel | 27.50 |
| Nos. 1 & 2 Bundles | 27.50 |
| Machine Shop Turnings | 20.00 |
| Mixed Borings, Turnings | 15.50-16.00 |
| Punchings & Plate Scrap | 33.00-36.00 |

Cast Iron Grades

| | |
|---|---|
| No. 1 Cupola Cast | $37.50-42.50 |

### HAMILTON, ONT.

(Ceiling prices, delivered)

| | |
|---|---|
| Heavy Melt. | $23.00 |
| No. 1 Bundles | 23.00 |
| Mechanical Bundles | 21.00 |
| Mixed Steel Scrap | 19.00 |
| Mixed Borings, Turnings | 17.00 |
| Rails, Remelting | 23.00 |
| Rails, Rerolling | 26.00 |
| Bushelings | 17.50 |
| Bushelings, new factory, prep'd | 21.00 |
| Bushelings, new factory, unprep'd | 16.00 |
| Short Steel Turnings | 17.00 |

Cast Iron Grades*

| | |
|---|---|
| No. 1 Cast | 48.00-50.00 |
| No. 2 Cast | 44.00-45.00 |

* Removed from price control Aug. 9, 1947; quoted on basis of f.o.b. shipping point.

# For High Density Bales...use the Self-Contained

# LOGEMANN Scrap Presses

## Press, Pump, Tank . . . all in one compact assembly

### Available with Automatic Control

Both two and three ram models are available with automatic controls . . . and are recommended when the nature of the scrap warrants such application and where high output is desired.

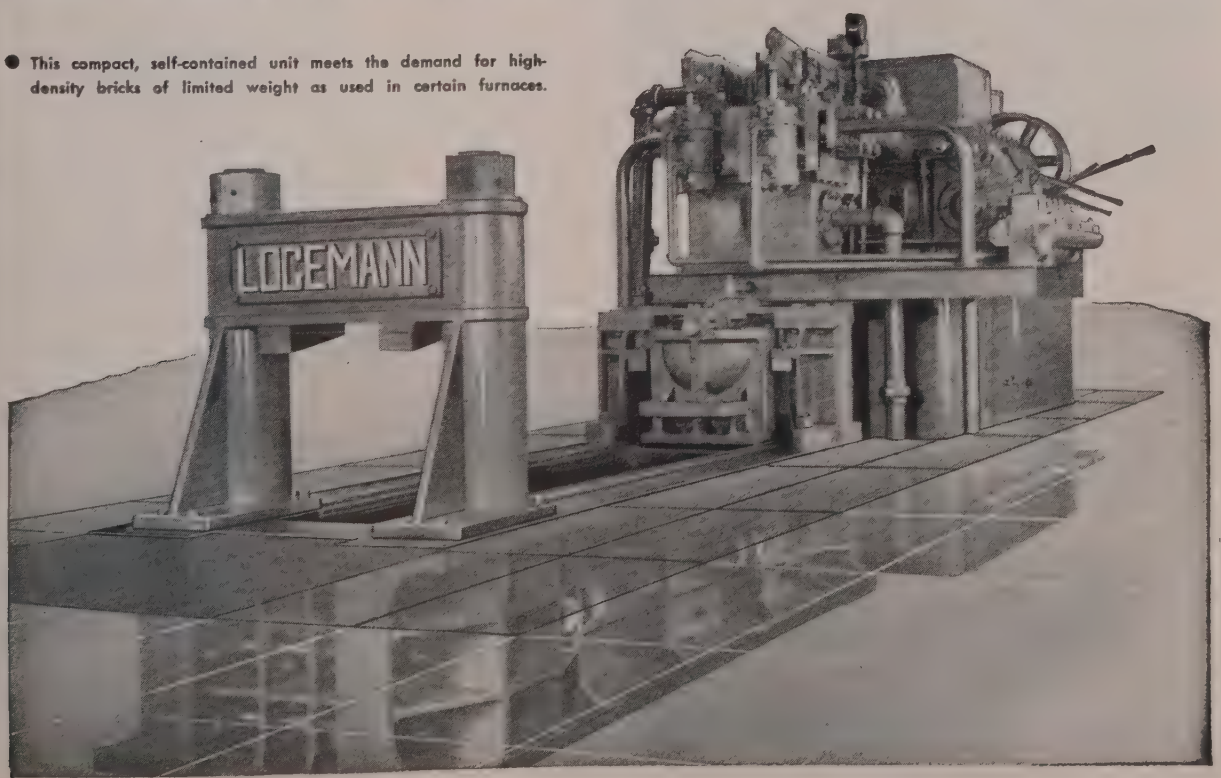
You conserve floor space and piping in plants and mills where space is limited . . . and at the same time, handle high tonnages at extremely low operating cost.

Pioneers in the metal baling field, LOGEMANN engineers have embodied the features proved through actual operation to be essential to constant, uninterrupted service. These same engineers are prepared to offer suggestions as to operating layout and installation of any unusual or specific need. Present your problem to them, stating the nature of your scrap and the tonnage desired. There is no obligation.

## LOGEMANN BROTHERS CO.

### 3164 W. BURLEIGH STREET • MILWAUKEE 10, WISCONSIN

● This compact, self-contained unit meets the demand for high-density bricks of limited weight as used in certain furnaces.



## Sheets, Strip . . .

Sheet Prices, Page 110

### Wheeling advances hot-rolled sheet extras. Sharon also revises extra card

**Pittsburgh** — Wheeling Steel Co. advanced hot-rolled sheet extras, Jan. 10, as follows: Gage and width extras, up $2 to $5 a ton; restricted thickness tolerance extra up 30 cents per 100 pounds to 50 cents when not more restricted than 75 per cent, up 50 cents to $1 when not more restricted than 50 per cent. As in case of other producers there no longer is a length extra base for 18 gage and heavier, thus establishing a price differential between coils and cut lengths with that of coils being cheaper. One series of extras for specific lengths is applicable for 18 gage and heavier, in contrast to previous pattern of one set of extras applying on 16 gage and heavier and another for 17 and 18 gage. The previous pickling extra of 25 cents per 100 pounds for all gages has been increased and classified as to gage as follows: 9 gage and heavier, 30 cents; 10 to 13 gage, 40 cents; and 14 to 18 gage, 50 cents. Resquaring extra has been increased from 5 to 10 per cent; corrugated (2-1/2 inch corrugations only) from 10 to 25 cents; breaker passing or back coiling, from 15 to 25 cents; stretcher leveled standard of flatness, 25 to 50 cents; special killed steel, from 25 to 35 cents; and heat treatment extras were advanced 25 cents per 100 pounds.

Sharon Steel Corp. advanced hot-rolled sheets and strip extras Jan. 1; also cold-rolled strip. The size and gage extras on hot-rolled sheets follow pattern established by Republic and Bethlehem, or somewhat lower than currently in effect by other producers. Inland Steel Co. and U. S. Steel Corp.'s subsidiaries are believed only major interests that have not yet adjusted sheet and strip extras.

**New York** — Sheet consumers are having to pay more on tonnage shipped in from outside the state, to the extent of the 6 per cent surcharge on interstate rates which became effective Jan. 11; however, there will be no change on shipments within the state until Feb. 4, when intra-state rates will be advanced. Some sheet consumers are pressing less actively as end-use requirements slow up, but the great majority of customers are still endeavoring to get more tonnage than the mills can supply.

Some sellers of stainless strip claim they are completely out of the market for the first quarter, although they still have tonnage available in stainless sheets, stainless plates and bars.

**Boston** — Flat-rolled tonnage not taken in against allocation is readily disposed of among other users and slackening in demand from scattered producers of light consumer goods is hardly reflected at mill level. Included are fairly substantial quantities of lower grade electrical sheets for motors with demand strong for transformer grades. Quotas for second quarter are being scheduled on electrical sheets and pattern of distribution is closely followed. Gray market and conversion deals are on the decline and consumers are paying more attention to costs, notably marginal producers building new items since the war. A tendency is developing to buy steel at lowest price from nearest normal supplier and additional shifts in source of supply appear ahead, once volume is available in larger tonnage.

**Philadelphia** — Added to some of the soft spots in the end-use requirements of sheets is an easing in demand for smoke pipe and elbows. Sheet sellers report slightly less pressure as a result, particularly in galvanized sheets. However, as galvanized sheets are one of the most scarce items of all the flat rolled products, requests for deferments in this direction will have little bearing on the general situation. As a matter of fact, sheet producers are now confronted with the commitment of having to supply 8000 tons of galvanized sheets and 40 tons of heavier hot-rolled sheets for grain bins each month for the six month period, March through August.

**Chicago**—Tighter supply conditions for sheet and strip customers of one of the district's larger mills are in prospect, the mill today beginning to make the structural changes which eventually will result in increased output. Taken out of operation for the remainder of the year at this mill are two open-hearth furnaces and while more finishing capacity will probably thus be open for conversion work, mill shipments of most of the company's products will fall as the result of the lower ingot output.

A mixed situation is developing among sheet and strip users, the number of stamping firms which are undergoing a slump in operations having increased and a more competitive market for their products having arrived. Companies making box strapping report, however, that demand is far from satisfied by the amount of steel which can be had. One product reportedly gaining in ease of availability as the result of manufacturing cutbacks is electrical sheets. Galvanized, while still extremely tight and scheduled to become scarcer to non-certified customers if the grain storage program is favorably acted upon, has shown a slight improvement due to seasonal lessening in demand from some fabricators.

**Cincinnati** — Demand for sheets is well sustained, occasional cutbacks in some consumer goods being counterbalanced by other needs, including a gradual increase in government requirements. No slackening of interest in second quarter deliveries is noted, although this tonnage will not be entered formally in books until later.

**Birmingham** — Sheet outlook is exceedingly strong at least through the first quarter, even in the face of some moderate slackening in demand by appliance manufacturers. Overall needs are reported little affected by a show of scattered spottiness. Fairfield mill, converted from hot to cold reduction, is on a trial run.

**Atlanta**—Atlantic Steel Co. has advanced its base price for hot-rolled carbon strip 20 cents per 100 lb to $3.65, effective as of Dec. 20.

## Steel Bars . . .

Bar Prices, Page 110

**Chicago** — Model changeovers in many segments of the automotive and truck industry are providing some relief from the tight steel supply situation. One local steel producer, experiencing an easing in demand on this account, has been able to offer to some of its customers for February delivery an increased tonnage of alloy bars from one of its mills. The mill has become almost current on orders. This temporarily easier situation in one company is not generally true for the industry, however, this being the only instance uncovered where more bar steel is actually available. In this same vein, however, it is reported that a local crankshaft producer has noticed an appreciable slackening in demand for truck crankshafts and, to a lesser extent, for passenger car units. The industry-wide demand-supply picture on carbon bars shows no change, notwithstanding a number of holdups on shipments which have been received from companies which are striving for a better inventory balance.

**New York** — There is still sufficient demand for hot carbon bars in various quarters to offset certain easing in others. In general, requirements still far exceed supply. Producers of cold-finished carbon bars are well sold up for the quarter and, while some have taken no action for the second quarter, most are booking tonnage more freely for the next 3-month period and even beyond in certain cases. Hot and cold alloy bar sellers are fairly well covered for the remainder of the quarter, although tonnage can still be had in most sizes for shipment in March.

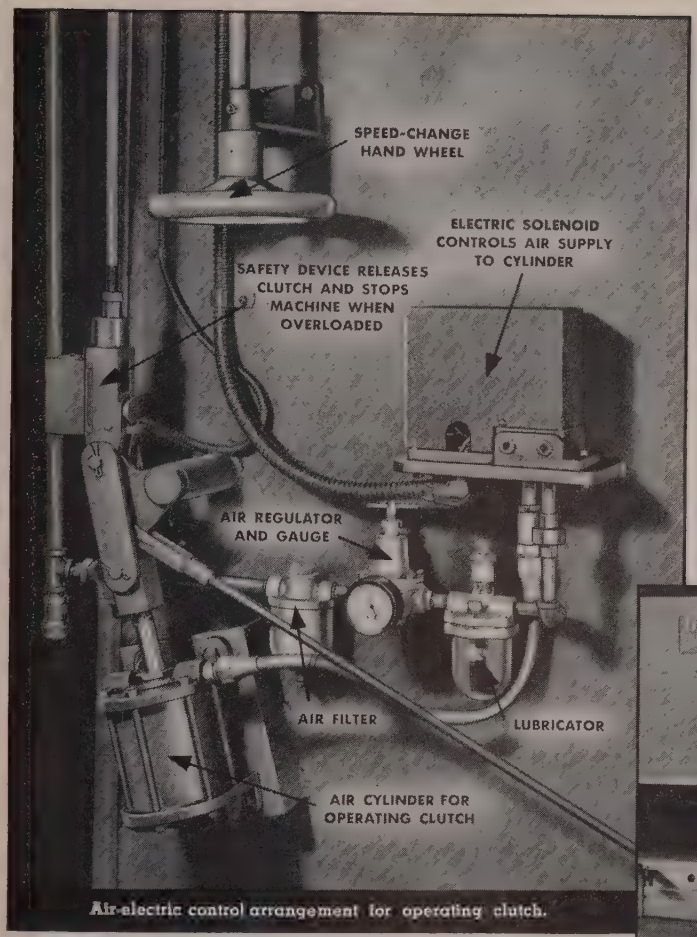
**Boston** — Although demand has eased slightly, producers of cold-drawn bars are maintaining pressure for hot-rolled to meet heavy commitments. Few consumers indicate they will need less tonnage this quarter. Any tonnage left over is readily redistributed. There is no excess in hot-rolled carbon bars with demand well ahead of supply.

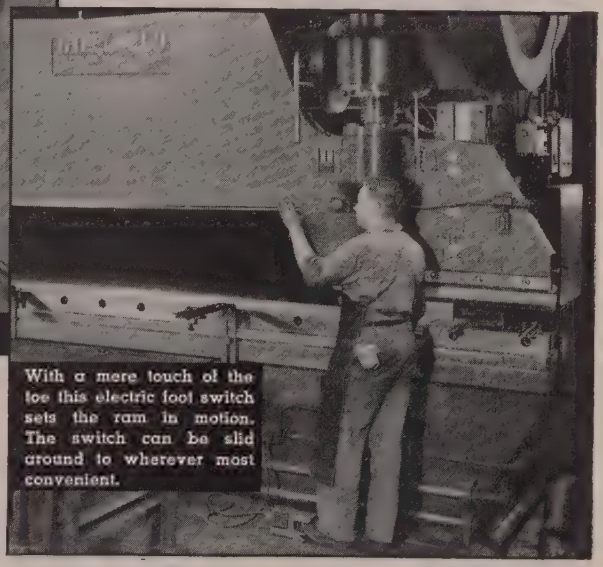
**Pittsburgh**—Forging shops note a slight easing in bar supply. However, sellers contend the relatively few openings in rolling schedules, resulting from customers' inventory adjustments, have been absorbed promptly. Cold-finishers have not experienced any easing in bar supply. Some automotive and farm implement concerns have requested reductions in mill alloy steel allotments for inventory reasons.

**Philadelphia** — A lag in bar demand from agricultural equipment manufacturers may be due in part to seasonal influences, although bar sellers point out that this has been the first sustained lull in that direction since the end of the war, and are inclined to attach more than passing significance to the development. Demand from machine and forge shops is fairly well sustained and, in general, needs far exceed supply.

**Atlanta** — Atlantic Steel Co. has advanced it base prices 30 cents per 100 lb to $4.40 for hot-rolled bars and 25 cents for 100 lb to $4.50 for bar size shapes, effective as of Dec. 20.

# Air-Electric Control for STEELWELD PRESSES


SPEED-CHANGE HAND WHEEL
ELECTRIC SOLENOID CONTROLS AIR SUPPLY TO CYLINDER
SAFETY DEVICE RELEASES CLUTCH AND STOPS MACHINE WHEN OVERLOADED
AIR REGULATOR AND GAUGE
AIR FILTER
LUBRICATOR
AIR CYLINDER FOR OPERATING CLUTCH
Air-electric control arrangement for operating clutch.


With a mere touch of the toe this electric foot switch sets the ram in motion. The switch can be slid around to wherever most convenient.

Various types of air-electric control can be furnished for Steelweld Bending Presses.

With this control an air cylinder does the work of throwing in the clutch which ordinarily is done by a mechanical foot-operated treadle. The air cylinder can be actuated by hand button, foot switch or various combinations of both.

Air-electric control eases the operator's work and speeds production of large orders of duplicate parts. It is especially advantageous in cutting costs when several hundred or more parts are produced at a time.

A selector is usually incorporated in an air-electric control circuit to provide various ram movements such as long stroke, short stroke, continuous operation and inching. For instance, it may be set to stop the ram on the down stroke just before the upper die reaches the lower one, or it may stop the ram at the top of each stroke.

Steelweld engineers are constantly on the alert for ideas and developing improvements that will aid the users of Steelweld Presses to get the most out of their machines.

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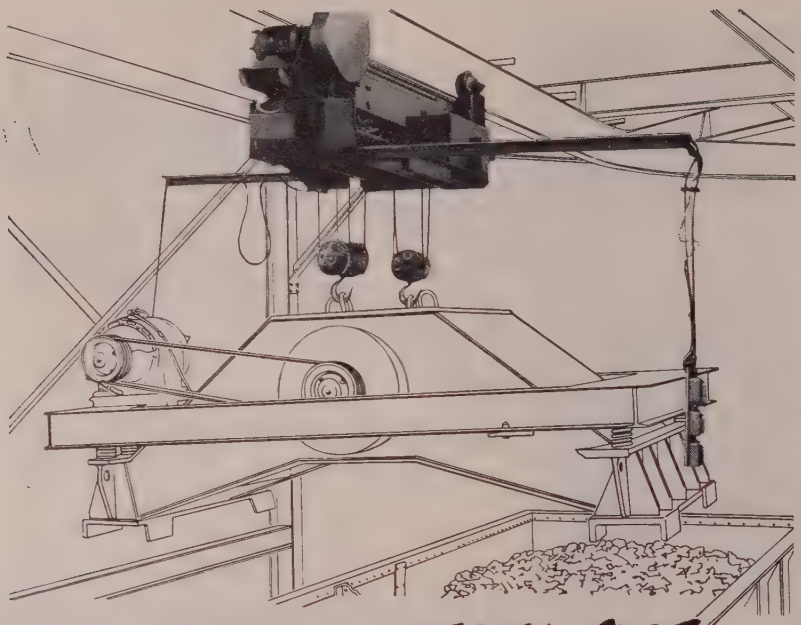

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Speed and efficiency of car unloading hit a new high with specially-designed Robbins & Myers Twin-Hook Hoists on the Robins Car Shakeout.

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**FEATURES** . . . Blocks are reeved with two independent steel cables. Either will hold the weight of the shakeout unit. Safety latches on the hooks eliminate unintentional releases of the load. Interlocking limit switches keep trolley motor from running until the shakeout clears the car; prevent operation of the shakeout motor until shakeout is positioned on another car.

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**CONTROL** . . . A push-button control panel, furnished as part of the hoisting mechanism, energizes the shakeout motor and the hoist motor; activates the trolley drive if the unit is motor driven. Contained in a dust-proof case, this equipment provides independent control of the hoist and shakeout from a single station.

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## Plates . . .

Plate Prices, Page 111

**Boston** — While some mills strive to become current by April, outlook is none too promising with carry-overs heavy and certified program tonnage mounting as engineering details involving additional plates become clarified. Large diameter pipe line commitments are heavy, which, added to voluntary distribution programs, leaves limited tonnage for general distribution. There is no slackening in demand; rather the contrary is the case with tank shops hard pressed for material, notably lighter gages. Heavier sizes are also limited in supply and most weldment shops are in need of plates.

Rice Bros. Corp., East Boothbay, Me., has a contract for construction of two Coast Guard lightships taking around 700 tons.

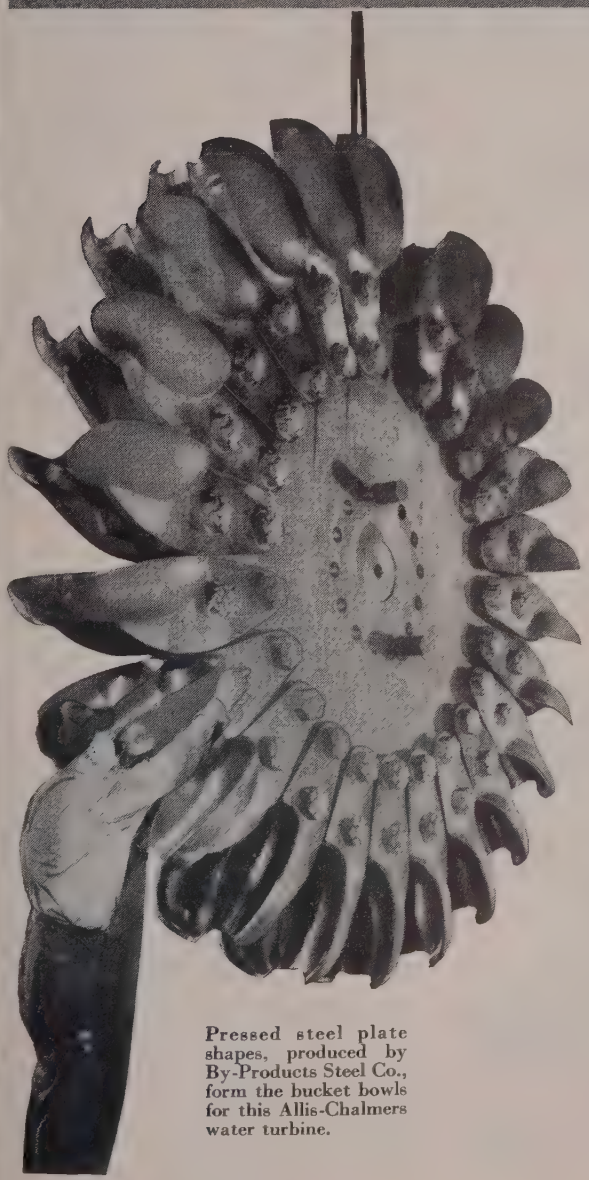
**New York** — Stringency in plates continues with no early let-up in sight. Mills now have set up consumer quotas for the entire quarter, with noncertified consumer allotments off somewhat due to the heavier priority programs. Delivered prices, here, now reflect the 6 per cent surcharge which became effective Jan. 11 on inter-state rates (New York intra-state increases do not become effective until Feb. 4). The new rate from New York to Sparrows Point is now 40.28c per 100 pounds.

**Philadelphia** — Stringency in plates is as pronounced as ever, with more tonnage to be diverted to voluntary allocation programs, notably about 2000 tons more for oil tanks and an increased tonnage for mining machinery. Both increases are effective in March for a period of six months. Producers already appear to be oversold for the current quarter. It would not prove surprising if at least some producers will have to blank out the first month or so of the second quarter on noncertified requirements, once they start setting up quotas for the next 3-month period. Producers note with interest, however, a lag in new railroad car demand and also the fact that over the past several weeks there have actually been some cancellations of car orders. Admittedly, car shops still have substantial backlogs, although not as heavy as a year ago, but should there be any prolonged lull, the possibility is that there might be some easing for car plates before the second half is over. Plate makers have indicated their willingness to go along on the present schedule of supplying sufficient steel for 10,000 freight cars per month for six months beyond the end of February, provided, of course, there is sufficient car work to warrant it.

**Birmingham** — Plate tonnage remains scarce as far as requirements for general distribution are concerned. Despite tacit denials, allocation of substantial tonnages at Gadsden to tube mill production continues to be felt in the district. Production schedules of plate-dependent industries continue to suffer.

**Seattle** — Plates are increasingly tight and the problems of fabricating plants are numerous. Operations are restricted to the amount of material available.

# ZERO TO 94,000 LBS. TO ZERO *in 1/30th second*



Pressed steel plate shapes, produced by By-Products Steel Co., form the bucket bowls for this Allis-Chalmers water turbine.

## . . . as water strikes these turbine buckets

Water, traveling 375 feet per second, imparts its energy to these turbine buckets at pressures reaching 47 tons per impulse. Add centrifugal forces and the erosive and corrosive effects of the water, and you realize why Allis-Chalmers Manufacturing Company sought stronger, longer-wearing materials for this use.

Buckets on this water wheel were fabricated from steel plate shapes produced at By-Products Steel Co. Service records on similar buckets show that these plate products have much longer life than cast buckets. Down time on Allis-Chalmers turbines has been reduced by their use, therefore.

Pressed steel products like these, made by By-Products Steel Co., are accurate in size and contour, requiring very little finishing. Plate products have the advantage that they are uniformly high in strength, dependable and safe.

Bulletin 270 illustrates the type of work done at By-Products Steel Co., Division of Lukens Steel Company, 414 Strode Avenue, Coatesville, Penna.

*"STEEL SHAPES FOR INDUSTRY", a 16mm motion picture in sound and color showing flame-cutting, bending, shearing, pressing, blanking and otherwise forming steel plate shapes, is available without charge. Running time: 20 minutes. Write for a booking date.*

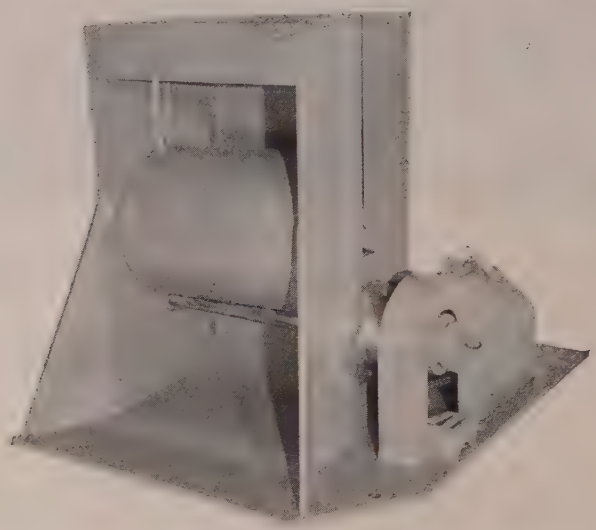
LUKENS
BY-PRODUCTS STEEL DIVISION

BY-PRODUCTS STEEL CO.

*STEEL PLATE SHAPES*

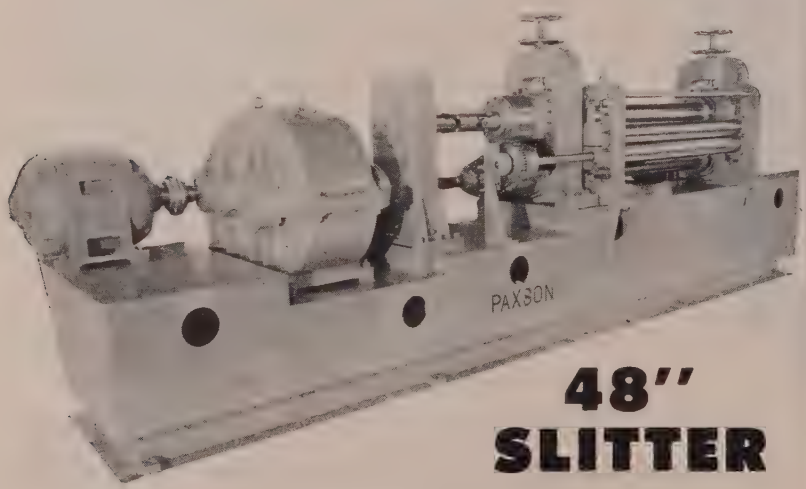
FLAME-CUT ★ SHEARED ★ PRESSED ★ BENT ★ BLANKED ★ WELDED

# PAXSON



## SCRAP BALLER

Here is a new design of an old tool. The steel scrap is fed into the machine and wound around a small driven arbor and at the same time is compressed by the floating roll. The bale of scrap, 18" x 24", then is removed by withdrawing the small arbor. The baler can be moved to any location in the plant where current is available and the design is such that the machine will not tip or slide on the floor. Motor, speed reducer and all electrical connections are included and delivery can be made in 60 to 90 days.




## 48" SLITTER

The Paxson 48" Slitter is designed for sheets and coils. Its maximum capacity is 11 cuts of 11 gage metal, 100' per minute when slitting sheets and 100'-800' per minute when slitting coils. The slitter is equipped with overriding clutches to allow free wheeling of the arbors when coils are being slit. Detachable pinch rolls are provided for use when slitting sheets.

We also manufacture coilers, levellers, pay off reels, edge rollers and the 84" Paxson slitter built for special requirements.

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**PAXSON MACHINE CO.**
SALEM, OHIO


## Structural Shapes . . .

Structural Shape Prices, Page 111

**Boston** — New structural tonnage up for estimates is limited largely to public work. Most utility work is expected to go ahead this year, but private building taking structural steel is gradually contracting with high costs the controlling factor in most cases. Plain material volume is limited and fabricating shops are estimating new work cautiously.

**Philadelphia** — District fabricators note a continued lag in private demand, with most work being of public character. Several new bridge projects are active, with another for the state on Penrose Ave., this city, requiring about 16,000 tons, expected up for figuring within a few weeks. Awards, however, do include some private contracts, the largest involving 200 tons.

**Birmingham** — Structural fabricators are not anticipating as sustained a demand in the first quarter as originally expected. A major proportion of pending contracts involves public work, but plans are tentatively in the making for additional small private construction.

**Seattle** — Fabricating plants must be selective in booking business within the limits of their mill allocations which are smaller than those in the last half 1948.

## Tin Plate . . .

Tin Plate Prices, Page 111

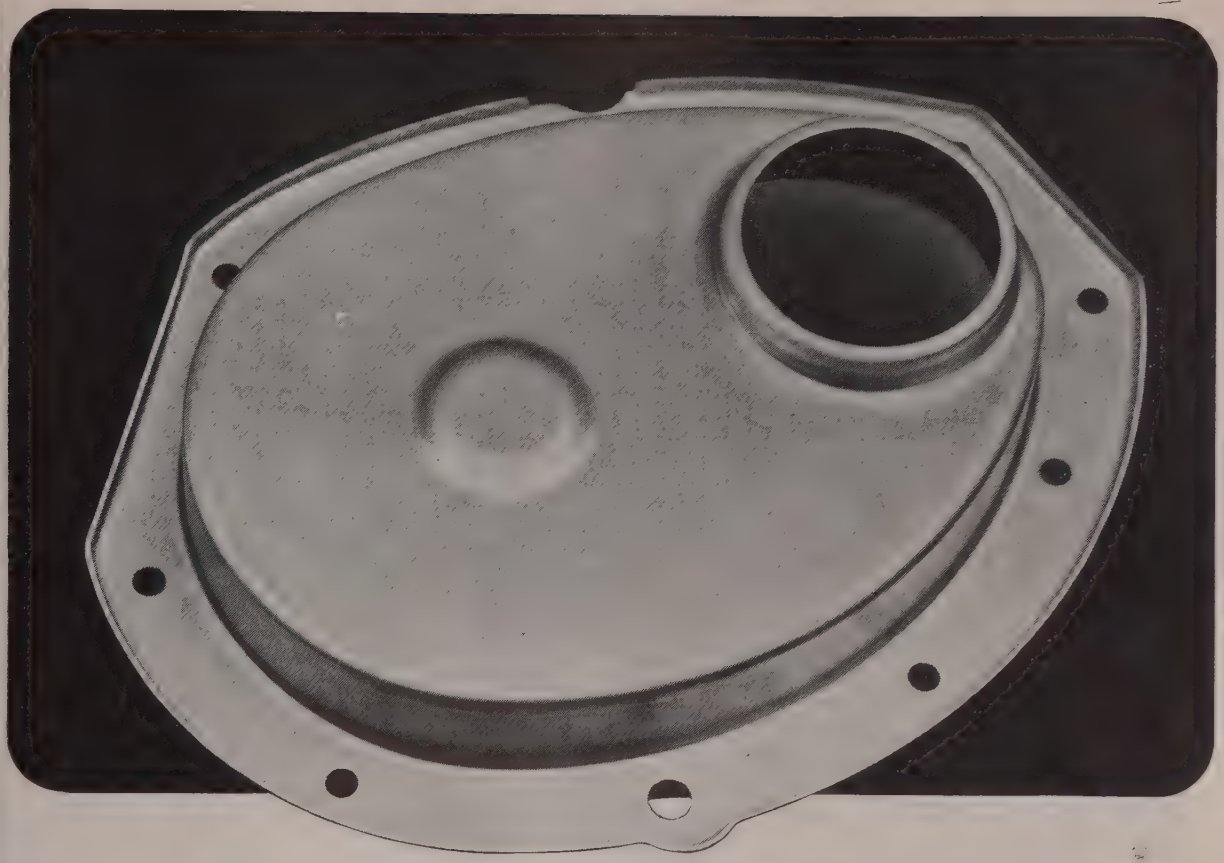
**Pittsburgh** — Output of tin mill products is not likely to improve until the start of the second quarter. Cold-reduction mill production schedules at two producers' plants will be retarded this quarter because of modernization programs on finishing units. Another interest is revamping its slab heating furnace facilities.

Wheeling Steel Co. established, Jan. 10, a commodity price to cover all gages in which holloware enameling stock is sold. The base price of $5.30 per 100 pounds for 29 gage has not been revised, with differentials of plus 10 cents for 30 gage and 20 cents for 31 gage also remaining unchanged. In gage range of 24 to 28 inclusive, which previously sold on cold-rolled sheet basis with applicable extras for deep drawing, etc., the following price differentials or deductions from $5.30 base have been established: 28 gage, 10 cents; 27 gage, 15 cents; down to 24 gage in additional increments of 5 cents. Since no extra for deep drawing, etc., will be applicable under this new pricing policy, the net effect on price level will be negligible.

## Reinforcing Bars . . .

Reinforcing Bar Prices, Page 110

**Seattle** — Rolling mill operations continue at capacity. Large order backlogs are on hand and constant pressure is being exerted for additional orders. The volume of small business forms a large aggregate. Demand is strong for merchant bars, largely for warehouse stocks, but reinforcing bars are in larger production.



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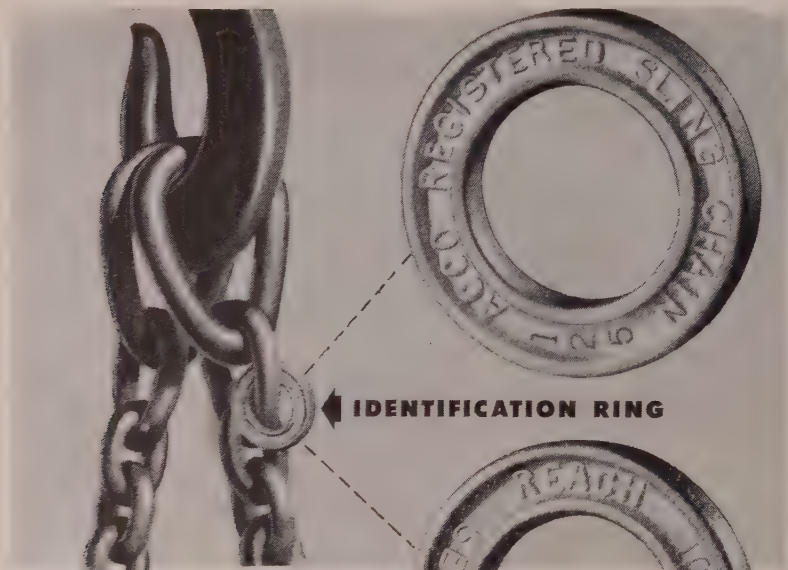


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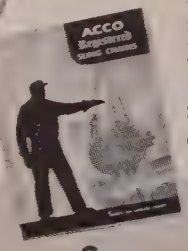


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## Wire . . .

Wire Prices, Page 111

**Boston** — Spreads in wire prices, which have been widening for some time, notably since f.o.b. pricing went into effect, appear due for a test once return to competition is reached. Shortages in low carbon continue, but some high carbon allocations are held up in part by a few consumers. Demand from larger users holds relatively better than with smaller consumers. While a decline in specification is not serious, more spotty situation prevails generally.

**Pittsburgh** — Demand for manufacturers wire shows little change, although in some instances, such as upholstery spring wire, consumers' inventories have recorded improvement and this subject is being watched more closely. For first time in years sellers report seasonal easing in demand for poultry and lawn fence. However, pattern on consumer demand for bulk of merchant wire products shows little variation with volume above current production.

Portsmouth Steel Corp. advanced galvanizing extras on nails 25 cents per 100 lb, effective as of Jan. 3.

**Birmingham** — No appreciable slackening in overall demand for wire is noted, although seasonal conditions have been evident recently. Jobbers anticipate a renewal of demand from agricultural users as soon as weather conditions permit more outside work. Some easing in manufacturers' wire is reported, but this is not expected to continue.

## Tubular Goods . . .

Tubular Goods Prices, Page 111

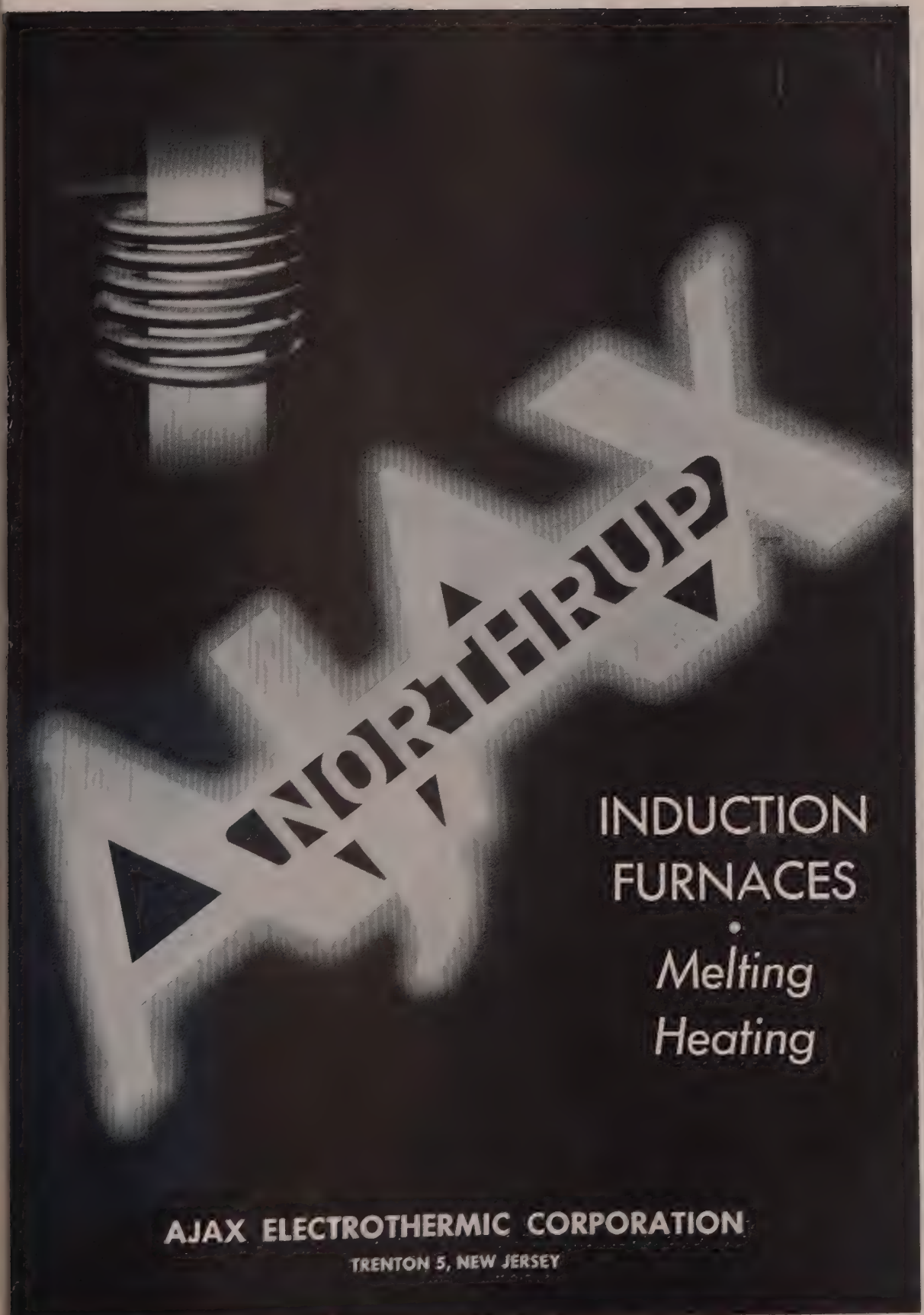
**Boston**—Decline in forward order backlogs with merchant steel pipe distributors indicates duplication of orders by plumbing and heating consumers, some of which are withdrawn as needs are met. Backlogs with some are off nearly 50 per cent. Demand for pipe, however, holds at a high level and is in excess of supply. Boiler tubes are sold through this year with some producers. Buying of light wall tubing is off, reflecting slackening in consumer good lines.

**Seattle** — Inquiries for cast iron pipe, while not numerous, include some sizable tonnages, other being about ready for bids. Mills have reduced delivery periods from 24 to 18 months.

## Bolts, Nuts . . .

Bolt, Nut, Rivet Prices, Page 111

**Pittsburgh** — Oliver Iron & Steel Corp. and Pittsburgh Screw & Bolt Corp. have advanced extras on track bolts as follows: For size and cut, up 40 cents to $3 per 100 pounds, with largest advance being for 11½ by ⅝-inch hexagon nut to $7.90; extra for bolts with square neck was advanced 50 cents to $1 per 100 pounds; bolts with cut threads, advanced 25 cents to 50 cents. In contrast to former quantity extra of 50 cents for 24 kegs or under, extra of 50 cents is now charged for quantities of 15 kegs to 24 kegs, inclusive, and 75 cents for 1 to 14 kegs, inclusive.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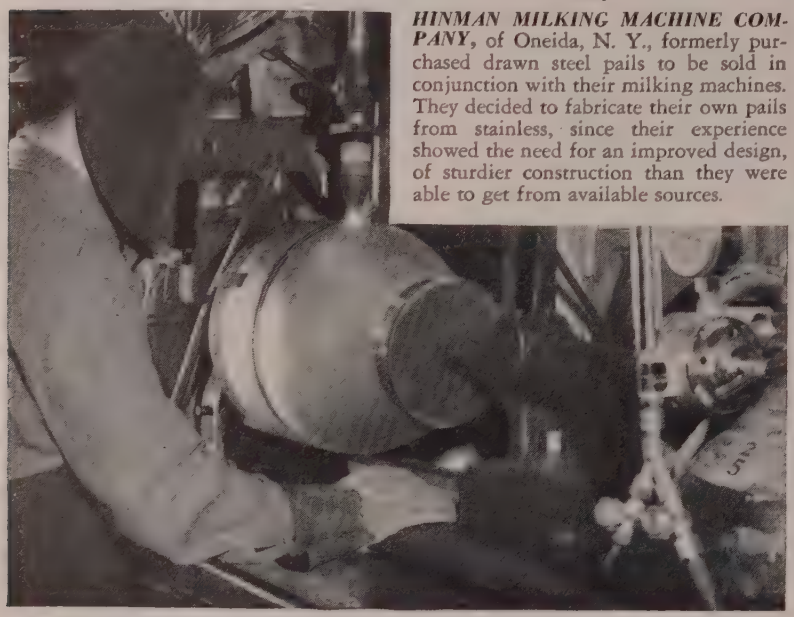
# Machine Heliwelding turns out a better milk pail at lower cost



*HINMAN MILKING MACHINE COMPANY*, of Oneida, N. Y., formerly purchased drawn steel pails to be sold in conjunction with their milking machines. They decided to fabricate their own pails from stainless, since their experience showed the need for an improved design, of sturdier construction than they were able to get from available sources.

*John View*, Airco Technical Sales Representative, was consulted and he suggested the Heliwelding process with the Airco machine holder, using Airco Helium. After Heliwelding, only a small amount of polishing was necessary to finish the job, making the cans ready for shipment.

This method was so successful that the customer was able to produce a top quality pail with a tidy saving in money — and time.

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## Pig Iron . . .

Pig Iron Prices, Page 112

**New York** — Pig iron demand reflects to some extent the continued lull in foundry operations here. Little consumer interest is being shown in foreign iron because of the substantial premiums that are still being asked. Reliable grades of both foundry and basic iron in relatively small lots are still being quoted at around $70 to $75 c.i.f. eastern seaboard, although in large lots substantially less can be done—possibly as low as $60. Such iron can be had for delivery within six weeks, or so.

With the 6 per cent surcharge becoming effective Jan. 11 on interstate rates, Brooklyn foundries are now having to pay $52.634 on No. 2 foundry, from Bethlehem, as against $52.40 peviously. As indicated, the surcharge brings the rate up to $4.134, not including the 3 per cent federal tax. The new delivered price on malleable from Bethlehem is $53.134. From Bethlehem to Newark, N. J., the new rate is $2.5334, not including tax; hence the delivered price on basic from Bethlehem is $50.5334; on No. 2 foundry, $51.0334; malleable, $51.5334 and bessemer, $52.0334. As the new surcharges in New York state do not become effective on intrastate rates until Feb. 4, delivered prices on iron from state furnaces into Brooklyn are unchanged for the time being.

**Boston** — Decline in melt includes to some degree several of the larger consumers, but as a whole this group is operating above average and maintains melt for the district which is, however, off nearly 45 per cent compared with year ago. Several of the larger shops have called in additional patterns from subcontractors and are doing more in their own foundries. To a considerabe extent, drop in melt among small shops is result of this. Subcontracting since war end has contributed heavily to overall melt. Some pressure is noted for production of basic by the Everett, Mass., furnace but before this is possible substantial yard stocks of foundry iron must be accumulated to cover shops under contract with Mystic during any schedule on basic. Including federal tax, new freight, Buffalo to Boston is $9.20 per ton.

**Pittsburgh**—Merchant pig iron supply is expected to fall short of overall foundry requirements throughout most of 1949, despite marked curtailment in operating schedules among some jobbing interests. However, there is prospect that surplus merchant iron may be offered here as in prewar. Small jobbing concerns consume less than 5 per cent of the merchant iron needs for this district. One steel foundry has received a defense order involving cast armor plate, while demand for rolling mill and railroad equipment continues strong.

**Philadelphia** — While some foundry operations are spotty, especially in certain nearby districts, such as Reading, pig iron sellers report a demand for all the tonnage they can produce. The Chester, Pa., furnace was scheduled to go into production over the past weekend, with the likelihood that the output at first would run around 200 tons daily. Eventu-

FOR

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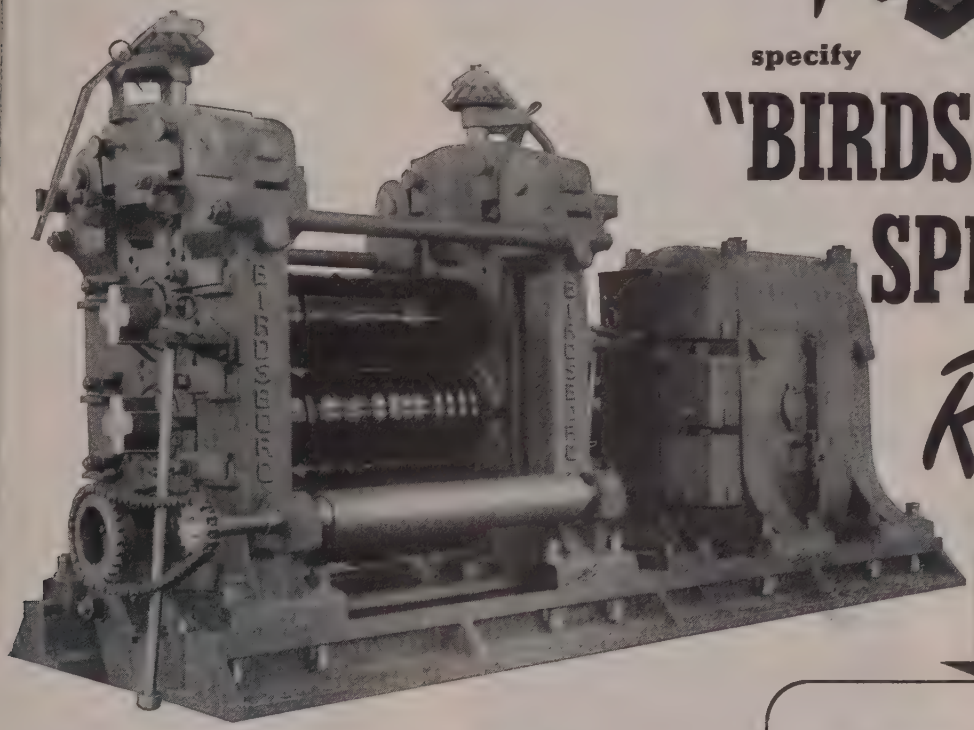

Designed particularly for 2-high and 3-high blooming and billet mills, "Birdsboro Special" rolls are made with the correct analyses and physical properties to meet your specific roll problem. Cast in our own foundries of the toughest and strongest alloy steels, they assure greater tonnage volume through long roll life and high speed operation.

If there is a metal reduction problem in the manufacture of your products, consult Birdsboro engineers for help in cutting, operating and maintenance costs as well as stepping up your production.

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ally, production is expected to reach 400 tons daily.

With the new 6 per cent surcharge effective since Jan. 11, the rate on iron from Bethlehem to Philadelphia is now $2.3002, thus bringing the delivered price of basic from that point up to $50.3002 per gross ton; No. 2 foundry $50.8002; malleable, $51.3002; bessemer, $51.8002. The new rate from Steelton is $2.9786, thus bringing the delivered price on low phosphorus from that point up to $56.9786.

**Chicago**—While pig iron suppliers profess to notice no easing in demand and no improvement in supply locally, some foundries report having been approached with offers of iron in excess of their present quotas. This may be the result of a few cancellations that were received from foundries which lost important contracts recently, largely from household appliance makers who either cut back production or pulled previously subcontracted work back into their own shops. Loss of castings business also has made inventories of high-priced foreign iron a matter of concern among some melters and some of this material is being offered for sale by these interests. The district's basic iron supply was lessened Jan. 12 when Inland Steel Co. blew out the furnace which had previously been scheduled to go down in December to conserve ore stocks. Relighting probably will occur in April.

Higher railroad tariffs which became effective on interstate shipment Jan. 11 have added 6 per cent to the freight bills of iron buyers in surrounding states, although among Chicago iron sellers it is universally believed the slightly higher delivered prices will not dampen demands of buyers to a noticeable extent.

**Cincinnati** — Supply of pig iron continues short of demand. Some melters, lacking castings orders, may have more iron than they need currently, but they are loath to cut back shipments. Instead, they will pile the iron, or drastically reduce use of scrap. Hence, foundries operating at a higher rate have only original quotas of iron and could use much more. Belief is general in the trade that some easing in the iron supply situation may develop during the year.

**Buffalo** — A survey of foundries in western New York reveals mixed tendencies on melting operations. There has been a rebound in operations at a number of gray iron producers. While activity has declined in malleable and steel foundries, the majority of the big operators look for a high level of output during the first half of 1949. The leading merchant iron seller in the district also reports improvement in current demand following a slackening toward the tail end of 1948.

**Birmingham** — Pig iron has been somewhat easier to obtain since the turn of the year, due in large measure to some slackening of activity by the foundry industry. However, cast iron pipe producers are quick to grab every pound thus made available. A large proportion of southern iron is being distributed in that district.

**St. Louis** — Pig iron demand shows few signs of softening despite numerous cutbacks in foundry operations. Apparently there are melters eager to expand operations and take up whatever drop in pig demand occurs in other quarters. Foundries doing a vigorous selling job and shifting their production away from plentiful items seem to have no difficulty in maintaining full operations. Iron production here holds at slightly above 1000 tons daily.

## Regulates Roofing Sales

A NEW state regulation in North Carolina governing sale of corrugated steel roofing and siding is being studied by steel companies.

The new regulation, No. 23 issued by the Division of Weights and Measures, State Department of Agriculture, is aimed at curbing some unscrupulous practices and requires sale prices of corrugated roofing to be based on the coverage provided between side laps. Coverage between end laps is reportedly not affected by the new law.

Corrugated roofing is sold by the square and without allowance for lap. The lap can vary, dependent on where the material is being used. Because of this variation it would be difficult to set up a pricing practice based on the area of sheet exposed after application, one seller pointed out. The result, it was suggested, could be a withdrawal of companies from corrugated roofing sales in North Carolina.

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## Warehouse . . .

Warehouse Prices, Page 113

**Boston** — Less steel is reaching warehouses this quarter and while consumer demand has softened slightly, lack of tonnage continues to squeeze warehouse distribution. Price spreads in stainless are narrowing and there is less confusion. Warehouses are now able to combine sizes in gage to obtain quantity. Most alloy inventories are in balance, but carbon products are short, notably extremely light and heavy plates.

**Philadelphia** — Recent application of 6 per cent surcharge is reflected in higher warehouse prices here, the advances in general ranging from 1 to 3 cents per hundred pounds. Business is recovering from the holiday lull, with the prospect that January volume will exceed that of December, both from the standpoint of price and tonnage.

**Cleveland** — Warehouses are figuring new prices to take into consideration new increases in railroad freight rates. Demand on warehouses continues heavy. However, most of them find they are in no better inventory position, for voluntary allocations programs are making it difficult to obtain sufficient mill shipments, particularly of carbon plate and sheets. One warehouse reported its mill receipts of carbon plate in November and December were only half those of October.

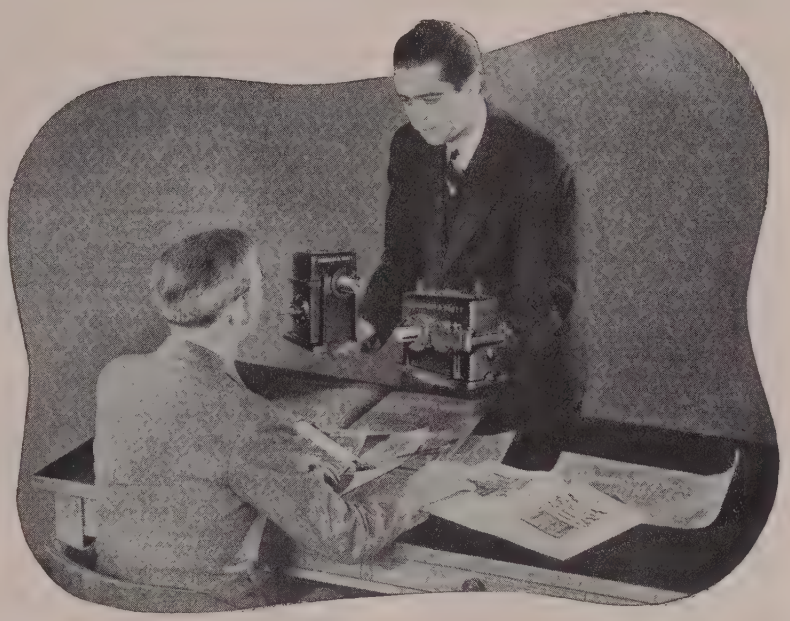
**Chicago** — Demandwise, tightness in steel supply seems unaffected by lowered output schedules in scattered fabricating plants. The degree of contraction in steel demand is impossible to determine since it has not amounted to enough to be shown in sales figures. In other words, what shrinkage has developed in recent weeks reduces only the excess of demand over supply and while the number of companies wanting more steel may have declined, those that still are unsatisfied are making their wants known more strenuously than heretofore in the hope that steel, in general, has become more readily available.

Individual buyers of steel, particularly those needing material for maintenance purposes, report no change in the tough time they have in trying to fill their wants from warehouses. Plate is most frequently mentioned in this connection.

Effect of the freight rate boost on warehouse prices is being minimized by warehousmen. Slight increase in switching charges on local mill shipments generally will be absorbed, and since much of the tonnage taken by several local distributors is supplied by two mills which have not increased extras on sheet and strip, other distributors appear somewhat reluctant for competitive reasons to boost prices.

Milwaukee warehouse prices on all products, however, are 1 cent higher.

**Cincinnati**—Steel jobbers sense a slowing in demand for some items, such as small and large bars and sheets, although they can still sell all available of the latter. There is an acute shortage of plates. Warehouse stocks throughout the district continue badly out of balance. Prices go up 3 cents per hundred pounds to meet the higher freight charges.

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## Scrap . . .

### Prices drop $2 on open-hearth and $3 to $5 on most cast grades in leading districts

Scrap Prices, Page 116

**Philadelphia** — Prices on open-hearth steel scrap have declined $2 a ton and on certain leading cast grades, $3 to $5 a ton. The latter follow previous declines recently of $2 a ton or so on an average, with the bottom of the decline apparently not yet reached. Heavy breakable cast is now holding at $55 to $56 delivered, with some consumers still withholding from the market. In fact, a cargo of foreign heavy cast now enroute to this country has been offered at less without acceptance.

The decline of $2 in open-hearth grades brings No. 1 heavy melting steel down to $43 to $43.50, delivered, and No. 2 heavy melting steel, No. 1 busheling and Nos. 1 and 2 bundles down to $39.50, with possibility of a still further decline before the market finally settles. The latest prices have been done on relatively small transactions, with the mills still moving cautiously.

Meanwhile, some of the larger mills are no longer offering springboard prices, which means that scrap that has been moving out of New England and certain adjacent areas will remain in the East. The mills and brokers are very strict on cancelling unfilled orders, the latter where their shipments have not been coming through on schedule. As a result there have been various cancellations.

As there is virtually no trading in No. 3 bundles, the price on this grade is purely nominal. Machine shop turnings and mixed borings and turnings have been reduced substantially to $34 to $35, delivered, and short shovel turnings to around $36 to $37. Electric furnace bundles are off to a spread of $46 to $47, delivered, and heavy turnings to $44.50 to $45.50. Bar crop and plate, punchings and plate scrap and cut structurals are all unchanged at $48 to $49. No. 1 chemical borings also are unchanged.

No. 1 cupola cast is down $4 a ton to $56 to $57, delivered; No. 1 machinery cast, $3 to $60 to $61. Charging box cast, as well as heavy breakable, is now holding at $55 to $56, delivered; unstripped motor blocks, $53.50 to $54.50; clean auto cast, $56 to $57; and No. 1 wheels $60 to $61.

**New York** — Brokers have dropped their buying prices from $2.50 to $3 a ton on heavy melting steel, the market now holding at $36 to $36.50, f.o.b. shipping point. They also have dropped quotations on No. 2 heavy melting, No. 1 busheling and Nos. 1 and 2 bundles to $34, and No. 3 bundles to $32. This represents a drop of $3 a ton in all grades.

Most cast prices have been dropped sharply, with No. 1 cupola and charging box cast now holding at $49, heavy breakable at $38, unstripped motor blocks $46.50 and malleable at $66 to $$67.

Some brokers believe that the prices on open-hearth scrap are now nearing the bottom of the present movement, but they are less certain with respect to the cast grades, which continue decidedly weak, notwithstanding exceptionally heavy declines recently. Disposition of most consumers is to hold off in anticipation of still lower prices. However, there is some buying because of sheer necessity.

Machine shop turnings and mixed borings and turnings are only slightly easier at $29, f.o.b. shipping point, and short shovel turnings at $30.

**Boston** — With buying light, scrap prices are generally lower and mixed with cast grades easier than steel. Heavy melting is off $2.50 per ton with brokers quoting $31.90, shipping point. Steel scrap consumers are unwilling to pay regional extras and springboards. Some orders for cast have been canceled.

**Buffalo** — Pronounced weakness swept through the scrap market here as prices slumped $2 to $3 a ton on sales of No. 2 heavy melting and bundles which aggregated approximately 10,000 tons. Price was $40, which compares with a recent formula price of $42.25. The leading mill consumer made the purchases while virtually all other large buyers were out of the market, pending developments. Additional orders were offered to the top mill at the $40 figure, but the offer was rejected, which left the market just about nil on bids, except perhaps at still lower levels.

Cast items and low phos also followed the skid in steelmaking grades. Best cupola cast and mixed material were off as much as $5, in some instances. Number 1 cast was down to $62 to $63, while mixed offerings hovered around $60.

Substantial reserve stocks now resting in mills' yards were cited as the principal factor on the bearish side. One mill has in the neighborhood of 100,000 tons on hand. Another has slightly less than this figure.

**Chicago**—Instead of a wave of buying which might have been touched off when Carnegie-Illinois Steel Corp. came into the market for a relatively minor tonnage recently and set the price level for open-hearth grades at $2 below that prevailing previously, scrap activity since that time has been at a virtual standstill. Not only dealer scrap is affected since only one mill is showing any interest in earmarked industrial material. Up to this time some dealer scrap has been moving against old contracts but even these have played out. Some brokers think the stand-off can last at least a month because of the comfortable inventories in all local mills, but there are other interests who look for resumption of buying inside of two weeks, when a more concrete price structure will be established. The current one defies accurate determination in the absence of sales. What cast and railroad material was sold last week, however, again brought less than it had in the previous week.

**Detroit** — A quiet tone prevails in the scrap market, although weakness which has shown in the East and in Chicago in steelmaking grades has not appeared here. Possibility is seen that dealer contracts at over-


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formula prices will not run out until around Feb. 1, thereby bolstering the local market. Cast iron scrap continues to sag, and a downward revision in quotations is expected soon.

**Pittsburgh**—Unusual degree of confusion prevails in the scrap market here with a decidedly weak price tone in evidence. Last week a leading steel mill consumer purchased No. 2 heavy melting steel dealer scrap at $41 and short shovel turnings at $38. Also this buyer no longer is paying springboards on dealer scrap or turnings. However, reports that this interest is paying $41 for industrial open hearth grades under contract commitments is denied. The company continues to pay $43, plus springboard, for industrial open hearth grades, including No. 1 heavy melting. However, relatively little No. 1 heavy melting steel can be obtained at $43 with some mills willing to pay premiums comparable to that on low phos quality material.

At the moment transition from a stabilized to a more open or fluctuating market is now a reality, with further easing in quotations a possibility. Some mills have not re-entered the dealer scrap market because of tonnage still outstanding on old orders. Some contend they can place orders for large tonnages of open hearth scrap at $41 but believe still lower prices soon will be offered.

Foundries continue out of the market resulting in further reduction of $2 per ton in offering prices for cast grades.

Award of the latest railroad scrap list is expected momentarily. On the basis of indicated bids, the price of railroad No. 1 heavy melting is expected to hold unchanged with rails and other items at slightly lower levels.

It is apparent from recent transactions in the scrap market that prewar trading habits are being restored Price defferentials between the various steelmaking grades again are appearing. For many months No. 1 and No. 2 heavy melting scrap, and No. 1 and No. 2 bundles have been quoted on the same level. The differentials formerly existing between these grades now apparently are being re-established. Purchases last week reflected this trend. This is in line with the steel mills recent emphasis on quality which has been made possible by the improved supply situation. Upgrading of scrap had been common until the mills recently tightened their inspections and began rejecting shipments that did not conform with specifications.

**Cincinnati** — Iron and steel scrap is lower, even formula prices being trimmed $3 to $4 as melters show disinterest in buying while their inventories are so heavy. One explanation of the weakening market was the run of favorable weather this winter without any prolonged blocks to preparation and shipment of scrap.

**Youngstown**—Steel plants here report that scrap supplies are definitely more plentiful and the quality is somewhat better than six months to a year ago.

However, plant executives insist there has been no important changes in prices here as yet.

**Birmingham**—The scrap market is definitely weaker. Some sources, heretofore hard pressed, are reported to actually have "too much scrap on hand," in view of marked price trends. Some tonnage is reported moving below formula prices.

**St. Louis**—Scrap market here remains on dead center with no sales in either cast or melting steel reported the first 10 days of the year. Prices, therefore, are unchanged merely because there have been no transactions. Foundries, many of them finding their own sales slack, are holding off purchases trying to adjust their orders and inventories.

**Los Angeles** — Although steelmakers generally are taking as much melting steel as at any time in recent months and there is no change in posted prices, there is a significant tendency among buyers to back away on large orders at the current formula. One underlying factor is the improvement in supplies resulting from the reopening of ocean shipping. Another depressant, obviously, has been the weakness of scrap prices in other districts. Cast iron grades are distinctly softer here, with prices off as much as $7.50. No. 1 Cast currently is quoted at $37.50-$42.50. Demand in this case has been tapering steadily for some months, and has yet to show any real improvement with start of the new year. On the one hand, foundry activity is considerably depressed, while on the other, current supplies of domestic and foreign pig are ample to meet foundry needs. Under those conditions little interest is being shown in cast iron scrap at present figures.

## Railroad Scrap Supply Gains

**Washington** — Railroads marketed about 4,350,000 gross tons of iron and steel scrap in 1948, according to the Institute of Scrap Iron & Steel Inc., this city. This scrap represented about 15 per cent of all the scrap added to inventory or consumed by steel mills and foundries. Measured by the mileage of railroads, the scrap they generated averaged almost 20 gross tons for every mile, or an increase of about 5 per cent over 1947. In 1949 the railroads will offer more scrap than in 1948.

## Rails, Cars . . .

Track Material Prices, Page 111

**Pittsburgh** — Bethlehem Steel Co. has issued a new extra card covering rails and track accessories, effective Dec. 15. Adjustments in prices include extras for specification, design, size and packing for track spikes; extras for size, threads, special chemistry, quantity, and packing were revised for track bolts. Similarly revisions were instituted for special chemistry, quantity and packing extras for screw spikes.

**Seattle** — Bethlehem Pacific Coast Steel Corp., Seattle, has booked about 15,000 tons of tie plates, spikes and bolts for three trans-continental railroads. Of tie plates, 8000 tons will be rolled for the Great Northern, 3000 tons for the Northern Pacific and about 2000 tons for the Chicago, Milwaukee, St. Paul & Pacific.


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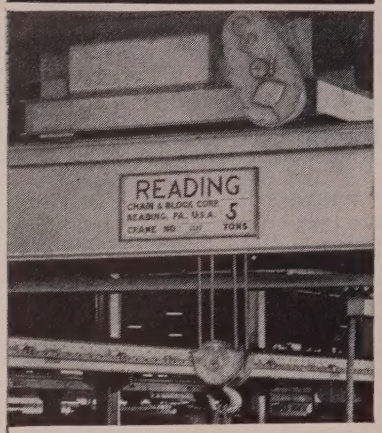


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## Export Steel Prices Rise

New York — United States Steel Export Co., this city, has advanced its export base prices, effective as of Jan. 11, to reflect increases in freight rates which became effective on that date. The price schedule covers principal carbon and alloy steel products with freight included to New York, Philadelphia or Baltimore.

The new schedule follows:

**CARBON STEELS**

| | Per net ton |
|---|---|
| Ingots: | |
| Re-rolling quality | $64.62 |
| Forging quality | 65.62 |
| Billets, Blooms and Slabs: | |
| Re-rolling quality | 67.62 |
| Forging quality | 76.62 |
| Tube Rounds | 91.62 |
| Rails | |
| Standard, 61 lb and over | 81.76 |
| Light, 60 lb and under | 86.47 |
| | Per 100 lb |
| Skelp | $4.12 |
| Standard Structural Shapes | 4.10 |
| C.B. Sections and Bearing Piles | 4.05 |
| Plates, Plain | 4.25 |
| Plates, Floor | 5.40 |
| Bars, Hot-Rolled | 4.22 |
| Bars, Concrete Reinforcing | 4.22 |
| Bars, Fabricated Reinforcing | 5.10 |
| Steel Sheet Piling | 4.90 |
| Strip, Hot-Rolled | 4.12 |
| Tight Cooperage Hoops | 4.47 |
| Joint Bars for Standard Rails | 5.52 |
| Tie Plates | 5.52 |
| Axles | 6.05 |
| Sheets | |
| H. R., 18 Ga. & heavier | 4.10 |
| C. R., 15 Ga. | 4.85 |
| Galvanized, plain 10 Ga. | 5.25 |
| Galvanized, corrugated, 10 Ga. | 5.35 |
| Vitrenamel, 12 Ga. | 5.25 |
| Electrical (electrical grade) | 6.80 |
| Tin Plate 107#: | Per Base Box |
| American Coke, 1.25 lb coating | $8.88 |
| American Coke, 1.50 lb coating | 9.13 |
| Ferrostan—unassorted: | |
| 0.25 lb coating | 7.83 |
| 0.50 lb coating | 8.08 |
| 0.75 lb coating | 8.38 |
| Manufacturing Ternes: | |
| Special coated, unassorted | 8.03 |
| Unassorted | 8.58 |
| Wire Products: | Per 100 lb |
| Wire Rods | $4.19 |
| Strip, C. R. (0.25 C and under) | 4.89 |
| Bright Nail Wire | 5.04 |
| Black Annealed Wire | 5.65 |
| Galvanized Plain Wire | 6.10 |
| Bars, Cold-finished | 4.81 |
| Bright Wire Nails | 6.28 |
| Bright Staples, 9 Ga. | 7.08 |
| Galvanized Staples, 9 Ga. | 8.03 |
| Barbed Wire: | Per 80 Rod Spool |
| Lyman, 4 pt. 5 in. | $6.23 |
| Glidden, 2 pt. 4 in. | 5.72 |

| | Discount | |
|---|---|---|
| American Standard Pipe, T & C: | Black | Gal. |
| Buttweld, 2½ in. and 3 in. | 41.6% | 20.1% |
| Seamless, 3½ in. to 6 in. | 34.6% | 12.6% |
| English Gas Tubes, T & C: | | |
| Buttweld, 2½ in. and 3 in. | 40.5% | 22.0% |

**Alloy Steels**

| | Per net ton |
|---|---|
| Ingots: | |
| Forging quality | $66.62 |
| Billets, Blooms and Slabs: | |
| Forging quality | 78.62 |
| | Per 100 lb |
| Bars, Hot-rolled | $4.60 |
| Bars, Cold-finished | 5.54 |
| Plates | 5.25 |
| Standard Structural Shapes | 4.90 |
| Strip, Hot-rolled | 5.97 |

**HIGH-STRENGTH STEELS**

| | Per 100 lb | | |
|---|---|---|---|
| | Corten | Manten | A-R Steels |
| Plates | $6.05 | $5.30 | $5.40 |
| Stand. Structurals | 5.80 | 5.05 | ... |
| C. B. Sections | 5.80 | 5.05 | ... |
| Sheets, Hot-Rolled | 5.80 | 4.95 | 5.25 |
| Sheets, Cold-Rolled | 6.90 | ... | ... |
| Sheets, Galvanized | 7.60 | ... | ... |
| Bars, Hot-Rolled | 5.95 | 5.00 | 5.35 |

## STRUCTURAL SHAPES . . .

**STRUCTURAL STEEL PLACED**

2500 tons, galvanized steel transmission towers for Bonneville Power Administration, to Columbia Steel Co., San Francisco.

800 tons, plant addition, General Electric Co., Philadelphia, to Bethlehem Fabricators Inc., Bethlehem, Pa.

300 tons, state hospital, Embreeville, Pa., to Anthracite Bridge Co., Scranton, Pa.

240 tons, state general hospital, Monroe county, Pennsylvania, to Bethlehem Fabricators Inc., Bethlehem, Pa.

240 tons, extension, county hospital, East Stroudsburg, Pa., to Bethlehem Fabricators Inc., Bethlehem, Pa.

235 tons, William L. Sayre Jr. high school, 58th & Walnut Sts., Philadelphia, through McCloskey & Sons, that city, to Bethlehem Steel Co.

200 tons, factory, Utz Potato Chip Co., Hanover, Pa., to Bethlehem Steel Co.

200 tons, Du Pont plant addition, Niagara Falls, N. Y., to Bethlehem Fabricators Inc., Bethlehem, Pa.

160 tons, Sinclair Refining Co., Philadelphia, to Bethlehem Fabricators Inc., Bethlehem, Pa.

160 tons, beams for platform extension, Pennsylvania Railroad station, 30th St., Philadelphia, through McCloskey & Sons, that city, to Bethlehem Steel Co.

125 tons, state bridge, Berks county, Pennsylvania, to Bethlehem Steel Co.

110 tons, factory, Binghamton, N. Y., through Sordoni Contracting Co., Forty-Fort, Pa., to Anthracite Bridge Co., Scranton, Pa.

110 tons, state bridge, York county, Pennsylvania, to Bethlehem Steel Co.

110 tons, Woolworth store addition, Scranton, Pa., to Bethlehem Construction Co., Bethlehem, Pa.

**STRUCTURAL STEEL PENDING**

16,060 tons, state bridge, Penrose Ave., Philadelphia; plans expected out in a few weeks.

1845 tons, state bridge, Middlesex county, New Jersey; bids Jan. 27.

600 tons, St. Josephs Hospital, Biddeford, Me.

500 tons, gates and anchorages, hydraulic power plant, New England Power Co., Wilder, Vt.

500 tons, alterations and additions, hospital, Clearfield, Pa.; bids Jan. 27.

320 tons, overpass, route S4B, section 1A, Fairlawn, Bergen county, New Jersey; bids Feb. 1, state highway commissioner, Trenton; work also takes 75 tons, concrete reinforcing bars.

250 tons, materials for Bonneville Power Administration substation; Isaacson Iron Works, low $61,815.

250 tons, substation for Seattle light department; Isaacson Iron Works, Seattle, low.

204 tons, section of state turnpike, near Harrisburg, Pa.; bids Jan. 17.

200 tons, section of state turnpike, Lancaster county, Pennsylvania; bids Jan. 17.

150 tons, West canal, Columbia Basin; bids opened by Bureau of Reclamation, Jan. 7.

Unstated, superstructure Clearwater river bridge, Lewiston, Idaho; bids to Bureau of Highways, Boise, Jan. 28.

Unstated, catwalks, pumping station and miscellaneous for Coulee pump station and Hungry Horse project, Montana; bids to Bureau of Reclamation, Jan. 25; specs. Nos. 2521 and 2522, respectively.

## REINFORCING BARS . . .

**REINFORCING BARS PLACED**

160 tons, music building, Washington State College, Bellingham, to Bethlehem Pacific Coast Steel Corp.; G. E. Tucker & Co., Seattle, general contract, $247,945.

160 tons, women's dormitory, Warm Springs, Mont., to Bethlehem Pacific Coast Steel Corp.; Askevald Construction Co., Missoula, general contract, $417,664.

160 tons, addition to St. Joseph hospital, Aberdeen, Wash., to Bethlehem Pacific Coast Steel Corp., Strand & Co., Seattle, general contract, $1,473,672.

#### REINFORCING BARS PENDING

6000 tons, East canal, Coulee wasteway; bids to Bureau of Reclamation, Jan. 25.

3230 tons, North dam, Columbia Basin; bids in to Bureau of Reclamation.

1400 tons, West canal, Columbia Basin project; bids in to Bureau of Reclamation, Jan. 7.

270 tons, state bridge, Middlesex county, New Jersey; bids Jan. 27.

Unstated, $385,000 Queen Anne fieldhouse; bids to Seattle Park Board, Jan. 21.

## PLATES . . .

#### PLATES PENDING

Unstated, Columbia Basin penstock, No. LS-3; bids to Bureau of Reclamation Feb. 3; spec. No. 2524.

## PIPE . . .

#### CAST IRON PIPE PLACED

250 tons, 6 and 8 inch, by Kent, Wash., to H. G. Purcell, Seattle, for U. S. Pipe & Foundry Co., Burlington, N. J.; balance of 90 tons to unstated interest.

#### CAST IRON PIPE PENDING

800 tons, 4 to 12 inch for local improvements; bids to Seattle, Jan. 19.

## RAILS, CARS . . .

#### RAILS PLACED

Santa Fe, 48,000 tons, including 42,000 tons to Colorado Fuel & Iron Corp. and 6000 tons to Carnegie-Illinois Steel Corp.

3223 E. 46th Ave., has awarded a $300,000 general contract to Swinterton & Walberg, 605 W. Olympic St., Los Angeles, for erection of a shop.

### CONNECTICUT

GREENWICH, CONN.—Apex Watch Case Co., 304 E. 45 St., New York, has awarded a $130,000 contract to C. N. & U. Corp., Lafayette Bldg., for construction of a factory on Old Field Point Rd.

NORWALK, CONN.—Zell Products Corp., 536 Broadway, New York, plans to build a $250,000 factory on Main St.; plans by Fletcher Thompson Co. Inc., 211 State St., Bridgeport.

### ILLINOIS

CHICAGO—Ward Steel Co., Boston, is constructing a warehouse at 51st and Whipple Sts. in the Kenwood manufacturing district.

CHICAGO—Pacific Car & Foundry Co., Seattle, is building a plant in Franklin Park to serve the central states territory.

CHICAGO—Block Steel Co., a newly organized firm, has purchased a plant at 1224 South Hannah Ave., on the Illinois Central Railroad in Forest Park.

CHICAGO—American Radiator & Standard Sanitary Corp. is building a structure near the corner of Roosevelt Rd. and Laramie St.; J. Emil Anderson & Son, general contractors, and Arthur M. Hede, architect.

CHICAGO—J. T. Ryerson & Son, 2558 W. Sixteenth St., has awarded a contract to Carl E. Erickson Co., 4657 N. Ravenswood St., for construction of a warehouse and office; Zimmerman, Saxe & McBride, 450 E. Ohio St., architect.

### MASSACHUSETTS

FALL RIVER, MASS.—J. & J. Corrugated Box Corp., 81 Ferry St., has awarded a $125,000 contract to Fred J. Rudd, 534 Weetamoe St., for erection of a factory addition at Ferry and Almond Sts.

LYNN, MASS.—General Electric Co., Meter & Instrument Divisions, will erect a building to house an electrical measurements laboratory.

WATERTOWN, MASS.—New England Telephone & Telegraph Co., 50 Oliver St., Boston, is planning to build a $200,000 warehouse addition at 705 Mt. Auburn St.; Fay, Spoffard & Thorndike, 11 Beacon St., Boston, engineer.

### MINNESOTA

MINNEAPOLIS, MINN.—Curtis Hotel Co., C. C. Melony, president, Tenth St. and Fourth Ave. S., is contemplating building a $500,000 garage and shopping center; plans by Magney, Tusler & Setter, 202 Foshay Tower.

### MISSOURI

ST. LOUIS—Viking Freight Co., 614 S. Sixth St., has awarded a $210,000 contract to V. & M. Construction Co., 4930 Chouteau Ave., for erection of a freight terminal at 1011 S. Broadway.

### NEBRASKA

OMAHA, NEBR.—Federal Envelope Co., 815 Harner St., has awarded a $200,000 contract to A. H. Brodkey, Brandeis Theatre Bldg., for construction of a manufacturing building at 43rd Ave. and Izard St.

### NEW YORK

NIAGARA FALLS, N. Y.—E. I. du Pont de Nemours & Co. plans a $3 million expansion of facilities for manufacture of polyvinyl alcohols at its plant.

WHITE PLAINS, N. Y.—Kraft Foods Co., 40 Worth St., New York, is planning to build a $150,000 distributing plant on Westmoreland Ave.

### OHIO

BUCYRUS, O.—A. & J. Pattern Works, 500 Norton Way, is being established by Richard P. Jennings and James E. Auld of Marion to make patterns for steel and iron castings.

BUCYRUS, O.—Aluminum Casting & Appliance Co., 518 Sears St., has been formed by P. H. Ryder, president; H. S. Siegel,

# CONSTRUCTION AND ENTERPRISE

### ARKANSAS

PINE BLUFF, ARK.—Finkbeiner Packing Co., 301 Mulberry St., plans to build a $750,000 meat packing plant.

### CALIFORNIA

EAST LOS ANGELES—National Screw & Mfg. Co. of California will erect a plant in the Slauson district to produce screws, bolts, and nuts.

HERCULES, CALIF.—Hercules Powder Co., Hercules, has awarded a $1 million contract to Bechtel Corp., 220 Montgomery St., San Francisco, for construction of an ammonia unit factory.

LOS ANGELES—Crenshaw Industrial Corp., 3650 E. Olympic Blvd., has awarded a contract to Ted R. Cooper, 1121 S. Hill St., for a $130,000 warehouse.

OAKLAND, CALIF.—Pacific Iron & Steel Co. plans a $100,000 expansion of its warehouse at 2600 Alvarado St., San Leandro.

OAKLAND, CALIF.—General Electric Co. is in process of a $1 million expansion of its transformer department at the Oakland Works here.

VERNON, CALIF. — Central Manufacturing Distributor Inc., 4814 Loma Vista Ave., has awarded a $200,000 contract to Wm. P. Neil Co., 4814 Loma Vista Ave., for a parts depot building at 3421 E. 46 St., for Hudson Motor Car Co.; Harry T. Miller, 1706 W. 48 St., architect.

### COLORADO

DENVER — Pacific Intermountain Express,

3 important operations
.. and a THOMAS machine for every one!
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EACH is a vital operation; only the right equipment makes it pay! That's why Thomas Metal-Working Machines have proved so popular in the shops of industrials, railroads and metal fabricators. Each type that bears the Thomas name does a job and does it better! Strong, sturdily built, convenient, easy to operate, and above all economical in production.
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vice president, and C. W. Ryder, secretary-treasurer, who plan to manufacture aluminum or other light metal alloys of castings and appliances and vessels in the building formerly occupied by the Wil-Van Equipment & Mfg. Co.

CLEVELAND—Joy Mfg. Co., 23000 St. Clair, has developed a coal mining machine which is designed to mine two tons of coal a minute.

CLEVELAND—Yoder Inc. is leasing its E. 91st & Saxe Ave. plant to the United Tube Corp. of Ohio, makers of mechanical tubing, formerly of Ellwood City, Pa.

CLEVELAND—McDowell Co. Inc., 3203 W. 71st St., will install $45 million worth of machinery in the new blooming mill to be constructed at National Tube Co. in Lorain, O. The blooming mill is part of a $100 million expansion at National Tube.

WICKLIFFE, O.—McNeil Machine & Engineering Co., Akron, has acquired more than 90 per cent of the capital stock of Cleveland Crane & Engineering Co. here, and plans to merge the two operations under its name.

## OKLAHOMA

OKLAHOMA CITY, OKLA.—Oklahoma Warehouse Co., 1701 N. W. Fifth St., has awarded a $130,000 contract to Hiram Elliott Construction Co., 922 Walnut St., Kansas City, Mo., for erection of an industrial warehouse; Neville, Sharp & Simon, 301 Midland Bldg., Kansas City, Mo., architect.

TULSA, OKLA.—Nelson Electric Co., 219 N. Detroit St., has awarded a $175,000 contract to DeWitt Construction Co., Tuloma Bldg., for erection of a warehouse and office at 526 N. Main St.; F. V. Kershner, 24 E. Eighteenth St., architect.

## PENNSYLVANIA

EASTON, PA.—General Aniline & Film Corp., 230 Park Ave., New York, is planning to build a $390,000 central research laboratory.

ERIE, PA.—General Electric Co., E. Lake Rd., has awarded a $2,500,000 contract to H. Platt Co., Selinger Ave., for construction of a warehouse.

ERIE, PA.—Parker White Metal Co., 2153 McKinley Ave., has awarded a $75,000 contract to H. Platt Co., 1104 Selinger Ave., for construction of a manufacturing building; Nelson & Goldberg, 208 Hays Bldg., architect.

FRANKLIN, PA.—Franklin Creek Refining Corp. plans to build a $100,000 power plant.

GLENWILLARD, PA.—A flash fire damaged the Pipe Line Service Corp. factory here, with estimated damage close to $1 million.

HARRISBURG, PA.—Allis-Chalmers Mfg. Co., 40 S. Cameron St., plans to construct a $300,000 warehouse and office east of the city.

PITTSBURGH—Graybar Electric Co., 37 Water St., has awarded a $500,000 contract to the Trimble Co., 1719 Pennsylvania Ave., for a distributing plant and office to be erected at Galveston and Ridge Sts.

PITTSBURGH—Carnegie Institute of Technology will continue its plans for a $4 million campus building and renovation program originally decided upon in March 1947, which will include a wing on Engineering Hall and a power plant and a steam and electricity distribution system.

WEST MIFFLIN, PA.—General Motors Corp., Fisher Body Division, General Motors Bldg., Detroit, is awarding separate contracts totaling $5 million for the construction of a stamping plant, manufacturing building, craneways, power plant, administration and office building; Argonaut Realty Co., 310 Research Bldg., Detroit, engineer.

# PRICES OF LEADING FERROALLOYS PRODUCTS

(*Continued from Page* 113)

### SILICON ALLOYS

**25-30% Ferrosilicon:** Contract, carload, lump, bulk, 18.5c per lb of contained Si; packed 19.90c; ton lots 21.00c, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

**50% Ferrosilicon:** Contract, carload, lump, bulk, 11.3c per lb of contained Si, carload packed 12.9c, ton lot 14.35c, less ton 16c. Delivered. Spot, add 0.45c.

**Low-Aluminum 50% Ferrosilicon:** (Al 0.40% max.) Add 1.3c to 50% ferrosilicon prices.

**75% Ferrosilicon:** Contract, carload, lump, bulk, 13.5c per lb of contained Si, carload packed 14.8c, ton lot 15.95c, less ton 17.2c. Delivered. Spot, add 0.8c.

**80-90% Ferrosilicon:** Contract, carload, lump, bulk 14.65-15c per lb of contained Si, carload packed 15.9c, ton lot 16.9c, less ton 18.05c. Delivered. Spot, add 0.25c.

**Low-Aluminum 85% Ferrosilicon:** (Al 0.50% max.). Add 0.7c to 85% ferrosilicon prices.

**90-95% Ferrosilicon:** Contract, carload, lump, bulk, 16.5c per lb of contained Si, carload packed 17.7c, ton lot 18.65c, less ton 19.7c. Delivered. Spot, add 0.25c.

**Low-Aluminum 90-95% Ferrosilicon:** (Al 0.50% max.). Add 0.7c to above 90-95% ferrosilicon prices.

**Silicon Metal:** (Min. 97% Si and 1% max. Fe.). C.l., lump, bulk, regular 19.0c per lb of Si c.l. packed 20.2c, ton lot 21.1c, less ton 22.1c. Add 1.5c for max. 0.10% calcium grade. Deduct 0.4c for max. 2% Fe grade analyzing min. 96% Si. Spot, add 0.25c.

**Alsifer:** (Approx. 20% Al, 40% Si, 40% Fe). Contract, basis f.o.b. Niagara Falls, N. Y., lump, carload, bulk, 8.90c per lb of alloy, ton lots packed 10.3c, 200 to 1999 lb 10.65c, smaller lots 11.15c. Delivered. Spot up 0.5c.

### BRIQUETTED ALLOYS

**Chromium Briquets:** (Weighing approx. 3¾ lb each and containing exactly 2 lb of Cr.). Contract, carload, bulk, 13.75c per lb of briquet, carload packed 14.45c, ton lot 15.25c, less ton 16.15c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

**Ferromanganese Briquets:** (Weighing approx. 3 lb and containing exactly 2 lb of Mn). Contract, carload, bulk, 10.00c per lb of briquet, c.l. packaged 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

**Silicomanganese Briquets:** (Weighing approx. 3½ lb and containing exactly 2 lb of Mn and approx. ½ lb of Si). Contract, c.l. bulk 10.0c, per lb of briquet, c.l. packed 10.8c, ton lot 11.6c, less ton 12.5c. Delivered. Add 0.25c for notching. Spot, add 0.25c.

**Silicon Briquets:** (Large size—weighing approx. 5 lb and containing exactly 2 lb of Si). Contract, carload, bulk 6.15c per lb of briquet, c.l. packed 6.95c, ton lot 7.75c, less ton 8.65c. Delivered. Spot, add 0.25c.

**(Small size—weighing approx. 2½ lb and containing exactly 1 lb of Si). Carload, bulk 6.30c, c.l. packed 7.10c, ton lots 7.90c, less ton 8.80c. Delivered. Add 0.25c for notching, small size only. Spot, add 0.25c.**

**Molybdic-Oxide Briquets:** (Containing 2½ lb of Mo each) 95.00c per pound of Mo contained. f.o.b. Langeloth, Pa.

### CALCIUM ALLOYS

**Calcium-Manganese-Silicon:** (Ca 16-20%, Mn 14-18%, and Si 53-59%). Contract, carload, lump, bulk 19.25c per lb of alloy, carload packed 20.05c, ton lot 21.55c less ton 22.55c. Delivered. Spot, add 0.25c.

**Calcium-Silicon:** (Ca 30-33%, Si 60-65%, Fe 1.50-3%). Contract, carload, lump, bulk 17.9c per lb of alloy, carload packed 19.1c, ton lot 21.0c, less ton 22.5c. Delivered. Spot, add 0.25c.

### TITANIUM ALLOYS

**Ferrotitanium, Low-Carbon:** (Ti 20-25%, Al 3.5% max., Si 4% max., C 0.10% max.). Contract, ton lots, 2" x D, $1.40 per lb of contained Ti; less ton $1.45. (Ti 38-43%, Al 8% max., Si 4% max., C 0.10% max.). Ton lot $1.28, less ton $1.35. F.o.b. Niagara Falls, N. Y., freight allowed to St. Louis. Spot add 5c.

**Ferrotitanium, High-Carbon:** (Ti 15-18%, C 6-8%). Contract, $160 per net ton, f.o.b. Niagara Falls, N. Y., freight allowed to destination east of Mississippi river and north of Baltimore and St. Louis.

**Ferrotitanium, Medium-Carbon:** Ti 17-21%, C 3-4.5%). Contract, $175 per ton, f.o.b. Niagara Falls, N. Y., freight not exceeding St. Louis rate allowed.

### VANADIUM ALLOYS

**Ferrovanadium: Open-Hearth Grade** (Va 35-55%, Si 8-12% max., C 3-3.5% max.). Contract, any quantity, $2.90 per lb of contained Va. Delivered. Spot, add 10c. **Crucible-Special Grades** (Va 35-55%, Si 2-3.5% max., C 0.5-1% max.), $3. **Primos and High Speed Grades** (Va 35-55%, Si 1.50% max., C 0.20% max.), $3.10.

**Vanadium Oxide:** Contract, less carload lots, $1.20 per lb of contained $V_2O_5$, freight allowed.. Spot, add 5c.

**Grainal:** Vanadium Grainal No. 1, 93c; No. 6, 63c; No. 79, 45c, freight allowed.

### TUNGSTEN ALLOYS

**Ferrotungsten:** (W 70-80%). Contract, 10,000 lb W or more, $2.25 per lb of contained W; 2000 lb W to 10,000 lb W, $2.35; less than 2000 lb W, $2.47. Spot, add 2c.

**Tungsten Powder:** (W 98.8% min.). Contract or spot, 1000 lb or more, $2.90 per lb of contained W; less than 1000 lb W, $3.

### ZIRCONIUM ALLOYS

**12-15% Zirconium Alloys:** (Zr 12-15%, Si 39-43%, Fe 40-45%, C 0.20% max.). Contract, c.l., lump, bulk 6.6c per lb of alloy, c.l. packed 7.35c, ton lot 8.1c, less ton 8.95c. Delivered. Spot, add 0.25c.

**35-40% Zirconium Alloy:** (Zr 35-40%, Si 47-52%, Fe 8-12%, C 0.50% max.). Contract, carload, lump, packed 20.25c per lb of alloy, ton lot 21c, less ton 22.25c. Freight allowed. Spot, add 0.25c.

### BORON ALLOYS

**Ferroboron:** (B 17.50% min., Si 1.50% max., Al 0.50% max., C 0.50% max.). Contract, 100 lb or more. 1" x D, $1.20 per lb of alloy. Less than 100 lb $1.30. Delivered. Spot, add 5c.

**Borosil:** (3 to 4% B, 40 to 45% Si), $6.25 per lb contained B, f.o.b. Philo, O., freight not exceeding St. Louis rate allowed.

**Bortam:** (B 1.5-1.9%). Ton lots, 45c per lb; smaller lots, 50c per lb.

**Carbortam:** (B 0.90 to 1.15%). Net ton to carload, 8c per lb, f.o.b. Suspension Bridge N. Y., freight allowed same as high-carbon ferrotitanium.

### OTHER FERROALLOYS

**Ferrocolumbium:** (Cb 50-60%, Mn 5% max., Si 8% max., C 0.5% max.). Contract, ton lot, 2" x D, $2.90 per lb of contained Cb, less ton $2.95. Delivered. Spot, add 25c.

**CMSZ Mixes:** (No. 4—Cr 45-49%, Mn 4-6%, Si 18-21%, Zr 1.25-1.75%, C 3-4.5%; No. 5—Cr 50-56%, Mn 4-6%, Si 13.50-16.0%, Zr 0.75-1.25%, C 3.50-5%). Carload, 12 M x D, carload packed 19.0c per lb of material, ton lot 19.75c, less ton 21.0c. Delivered.

**Silcaz Alloy:** (Si 35-40%, Ca 9-11%, Al 6-8%, Zr 3-5%, Ti 9-11%, Boron 0.55-0-75%). Carload, packed, 1" x D, 43c per lb of alloy, ton lot 45c, less ton 47c. Delivered.

**SMZ Alloy:** (Si 60-65%, Mn 5-7%, Zr 5-7%, Fe 20% approx.). Contract, carload, packed, ½" x 12 M, 16.5c per lb of alloy, ton lots 17.25c, less ton 18.5c. Delivered. Spot, add 0.25c.

**Graphidox No. 4:** (Si 48-52%, Ca 5-7%, Ti 9-11%). C.l. packed, 16.50-17.00c per lb of alloy; ton lots 17.90-18.00c; less ton lots 19.40-19.50c, f.o.b. Niagara Falls, N. Y.; freight allowed to St. Louis.

**V-5 Foundry Alloy:** (Cr 38-42%, Si 17-19%, Mn 8-11%). C.l. packed, 14.25c per lb of alloy; ton lots 15.75c; less ton lots 17.00c, f.o.b., Niagara Falls, N. Y.; freight allowed to St. Louis.

**Simanal:** (Approx. 20% each Si, Mn, Al). Packed, lump, carload 11c, ton lots 11.25c, smaller lots 11.75c per lb alloy; freight not exceeding St. Louis rate allowed.

**Ferrophosphorus** (23-25% based on 24% P content with unitage of $3 for each 1% of P above or below the base): Gross tons per carload, f.o.b. sellers' works, Mt. Pleasant, or Siglo, Tenn.; $65 per gross ton.

**Ferromolybdenum:** (55-75%). Per lb, contained Mo, f.o.b. Langeloth and Washington, Pa., furnace, any quantity $1.10.

**Technical Molybdic-Oxide:** Per lb, contained Mo, f.o.b. Langeloth, Pa., packed in bags containing 20 lb of molybdenum, 95.00c.